INVESTIGATIONS OF POLY-CHLORINATED BIPHENYLS IN BOTTOM SEDIMENTS OF THE BEAR-WAPITI-SMOKY-PEACE AND UPPER ATHABASCA RIVER SYSTEMS, 1989-2000

Investigations Of Poly-Chlorinated Biphenyls In Bottom Sediments Of The Bear-Wapiti-Smoky-Peace And Upper Athabasca River Systems, 1989-2000

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SUMMARY

Polychlorinated biphenyls (PCBs), once widely used in industrial applications and consumer products, are of concern due to their persistence and toxicity in the environment. Their low solubility leads to their accumulation in soils, sediments, and biological tissues, where they can persist indefinitely. This property also leads to the progressive accumulation of PCBs in the food web (biomagnification), which means that low levels of PCB contamination in the environment may present a risk to humans who consume animals that occupy a relatively high position in the food web (e.g., some sport fish).

Studies of contaminant distributions by the Northern River Basins Study (NRBS) revealed high levels of PCBs in fish in the upper Athabasca and in the Wapiti-Smoky rivers, relative to other areas in the basins. In response to recommendations of the NRBS, the purpose of this work was to investigate the source and reasons for the PCB contamination. In co-ordination with other projects under the Northern Rivers Ecosystem Initiative (NREI) on fish, water, and benthos, this project investigated PCBs in river bottom sediments to see if there were spatial or temporal patterns that might identify the source(s) of contamination.

River bottom sediments were collected in fall in the 1997-2000 period from sites throughout the Wapiti, Bear, Smoky, upper Peace, and upper Athabasca rivers. Archived sediments collected from the Wapiti River in 1989 and 1992 were also utilized. The sediments were analyzed for PCB congeners by Axys Analytical Services Ltd., using gas chromatography – high resolution mass spectrometry (GC-HRMS). Sediment particle size and organic carbon content were also analysed.

In the 65 sediment samples analysed, total PCB concentrations ranged from below analytical detection levels to 3.2 µg/kg dry weight, all much less than the Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guideline (ISQG) of 34.1 µg/kg. However, there were spatial and temporal patterns that indicated several possible PCB sources in the study area. The Wapiti River had somewhat elevated PCB concentrations downstream of the pulp mill, and downstream of the Bear River inflow, consistent with the pattern of PCB contamination in fish. The pulp mill location appears to be a source, potentially as a result of residual PCBs from the spill that occurred there in 1978.

The Bear River appeared subject to PCB inputs in the Grande Prairie area, potentially from historic and/or persistent sources. Sediment PCB levels in the impoundment on the river in Grande Prairie, and at sites downstream of there, are well above apparent background levels, although still within guidelines.

PCBs in sediments of the Peace River near the Smoky River confluence were low in concentration and similar to those in the lower Smoky River. This contrasts with the anomalously high concentrations reported by NRBS for that location on the Peace River.

PCBs in sediments in the Athabasca River upstream of Hinton are somewhat higher than in the upper Wapiti-Smoky rivers. PCB levels downstream of Hinton were slightly above levels observed at upstream sites, but not consistently so. Hardisty Creek, a tributary to the Athabasca

River in Hinton, had distinctly higher PCB concentrations in sediment. The concentration at the mouth of Hardisty Creek was well in excess of that at other sites in the study area, although still below the CCME guideline.

Although associations between PCB concentration, sediment particle size, and organic carbon content have been identified in other studies, no such association was found in the present study. Location appeared to be more important in determining sediment PCB concentrations.

While other chlorinated organic compounds associated with bleached kraft pulp production (dioxins and furans) are reported to be declining in fish tissue following improvements at pulp mills in the study area, a similar trend was not observed in sediment PCBs. This indicates that the PCB contamination identified during the Northern River Basins Study may have origins other than pulp mill effluent.

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ABBREVIATIONS

AENV	Alberta Environment
CCME	Canadian Council of Ministers of the Environment
DOC	Dissolved Organic Carbon
HCE	Hinton Combined Effluent
HR-GCMS	High-Resolution Gas Chromatography-Mass Spectroscopy
ISQG	Interim Sediment Quality Guideline
NRBS	Northern River Basins Study
NREI	Northern Rivers Ecosystem Initiative
NWRI	National Water Research Institute
PCB	Polychlorinated Biphenyl
ΣPCB	sum of PCB congeners that meet or exceed quantification criteria
pg/L	picograms per litre
ppb	Parts per billion
QA	Quality Assurance
QC	Quality Control
TOC	Total Organic Carbon
µg/kg	micrograms per kilogram
WCW	Weyerhaeuser Cooling Water
WFE	Weyerhaeuser Final Effluent
WWTP	Wastewater Treatment Plant
Ø	Diameter

1.0 INTRODUCTION

1.1 Background

Polychlorinated biphenyls (PCBs) are a closely related group of chlorinated organic compounds formed by the addition of chlorine to two benzene rings linked by a single carbon-carbon bond. The location and degree of chlorine substitution differentiates this group of 209 species or congeners, which by convention of the International Union of Pure and Applied Chemistry (IUPAC) are numbered from 1-209. The physicochemical properties of the PCB congeners vary considerably according to the degree of chlorine substitution. Aqueous solubility and vapour pressure generally decrease with increasing chlorine substitution, while the potential for adsorption to organic sediments increases. PCBs were commercially produced in North America under the trade name Aroclor as formulations that are identified by the percent chlorine content. Although Aroclors having a similar percent chlorine composition have similar physicochemical properties (density, solubility, vapour pressure, etc.), their exact composition varies considerably between batches.

PCBs were favoured as insulating fluids in electrical transformers and capacitors because of their high boiling point, high degree of chemical stability, low flammability, and low electric conductivity. These properties also led to their widespread use in printing inks, pesticides, carbonless copy paper, hydraulic fluids, paints, and adhesives, among other applications. Commercial production of PCBs began in 1929 and continued in Canada until the late 1970s, when restrictions on their manufacture, importation, and use were imposed. Under current legislation, applications that were manufactured prior to 1980 may remain in use but are subject to stringent maintenance and handling regulations (CCREM 1987).

The physicochemical properties that made PCBs commercially desirable also contribute to their ubiquity and persistence in the environment. They are chemically stable and highly resistant to degradation, although microbial dechlorination may play an important role in modifying the composition of PCB mixtures in the environment. Because of their hydrophobicity, PCBs tend to accumulate in soils and sediments and can persist indefinitely. PCBs are highly lipophillic and thus are retained in biological tissues (bioaccumulate). They also accumulate progressively in the food web (biomagnify), so that PCB concentrations in organisms like aquatic invertebrates and fish can be substantially higher than in abiotic matrices, particularly if the organisms occupy a high place in the food web.

A study of contaminants in fish by the Northern River Basins Study (NRBS) revealed the presence of PCBs in fish tissues collected in the Athabasca and in the Wapiti-Smoky-Peace River basin of Northern Alberta (Pastershank and Muir 1996). PCB levels were generally higher in the upper portions of these river systems. Burbot, longnose sucker and northern pike livers from the Wapiti and Smoky rivers contained the highest PCB levels relative to samples collected elsewhere in the Peace and Athabasca River basins. Burbot livers typically contained significantly higher PCB levels than longnose sucker or northern pike livers. This was attributed to the high lipid content of burbot livers and to their piscivorous feeding habits. The observed levels of PCBs in burbot and mountain whitefish tissue contributed to the fish consumption advisories in the Wapiti-Smoky and in the upper Athabasca River systems. A more recent study

of fish tissue contamination in the Athabasca and in the Wapiti-Smoky-Peace rivers revealed that while levels of other organochlorine compounds have declined significantly from those detected during the Northern River Basins Study, PCB levels remain at or near the levels reported in the 1996 study (Muir and Fraikin 2003).

The distribution of PCB concentrations in fish reported in the Northern River Basins Study suggests that the sources are likely located in the more upstream portions of the Athabasca and Wapiti/Smoky river basins. While certain chlorinated organics such as dioxins and furans are clearly derived from industrial point sources in the Athabasca and Wapiti/Smoky basins, it is not clear whether the same sources are also implicated in PCB contamination. The upper Athabasca and Wapiti/Smoky basins are areas of urban and industrial concentration, and are probably subject to contamination from diverse sources due to the widespread and largely unregulated historic use of PCBs. These putative sources have for the most part not been identified. As well, atmospheric deposition has made PCBs ubiquitous in the aquatic environment, and may account for apparent background contamination (e.g., Wania and Mackay 1993). The only documented release of PCBs directly to a river in the study area occurred at the Weyerhaeuser (formerly Proctor and Gamble) pulp mill near Grande Prairie, where the rupture of a transformer resulted in the release of Askarel to the Wapiti River through the effluent treatment system (Pledger, 1981). Although this spill occurred in 1978, the resulting contamination may persist in sediments downstream of the pulp mill.

A sediment contaminant study was conducted by Northern River Basins Study concomitantly with the fish tissue study, to provide information on contaminants in mixing zones below bleached kraft pulp mills (Crosley 1996). This included analyses of PCBs in the clay-silt (∅ <0.063 mm) fraction of sieved bottom sediments from the Athabasca and Peace River basins. That work revealed detectable PCB levels in the Athabasca and Peace Rivers, as well as in two major tributaries to the Peace River, the Wapiti and Smoky rivers . Sediment PCB concentrations in the Wapiti- Smoky-Peace rivers, reported as Aroclors 1242/1254/1260, were indicated to be highest in the Peace River upstream of its confluence with the Smoky River. However, PCB levels in sediments collected from the Peace River above the Smoky River and reported here (Section 3.3) approach analytical detection limits, indicating that the elevated levels measured at this site during the NRBS may have been anomalous. Sediment PCB concentrations were considerably lower in the Wapiti and Smoky rivers, where PCB concentration in burbot, northern pike and longnose sucker livers were found to be highest (Crosley 1996; Pastershank and Muir 1996). Levels of PCBs detected in Athabasca River sediments were similar to those detected in the Wapiti and Smoky River sediments. Fish tissue contamination in the Athabasca River was generally lower than in the Wapiti, Peace, or Smoky rivers.

1.2 Objectives

The present study was undertaken to investigate the sources of fish tissue contamination observed during the Northern River Basins Study, in response to recommendation number 13 of the NRBS 'Report to the Ministers' (Governments of the Northwest Territories, Alberta, and Canada 1997):

> [that] The Ministers direct further investigation to be undertaken into defining the extent of PCB contamination and their sources in the Wapiti, Smoky, Peace and Athabasca River systems (NRBS 1996).

Specifically, Alberta Environment conducted investigations of sediment contamination in the upper Wapiti-Smoky and Athabasca River basins to resolve whether spatial or temporal patterns in sediment PCB concentrations might identify the sources of contamination in fish tissue (Figure 1). Study areas were selected based on the magnitude of fish tissue contamination observed during the Northern River Basins Study, and on potential sources of contamination. Surface sediments were collected from the Wapiti, Bear, Smoky, and Peace rivers in 1997. Initial analysis of several of the 1997 samples suggested contamination in Bear River sediments, which subsequently were sampled more extensively in 1998. Archived samples from the Wapiti River collected in 1989 and 1992 were also analysed. Sediments were collected from the Athabasca River in 2000.

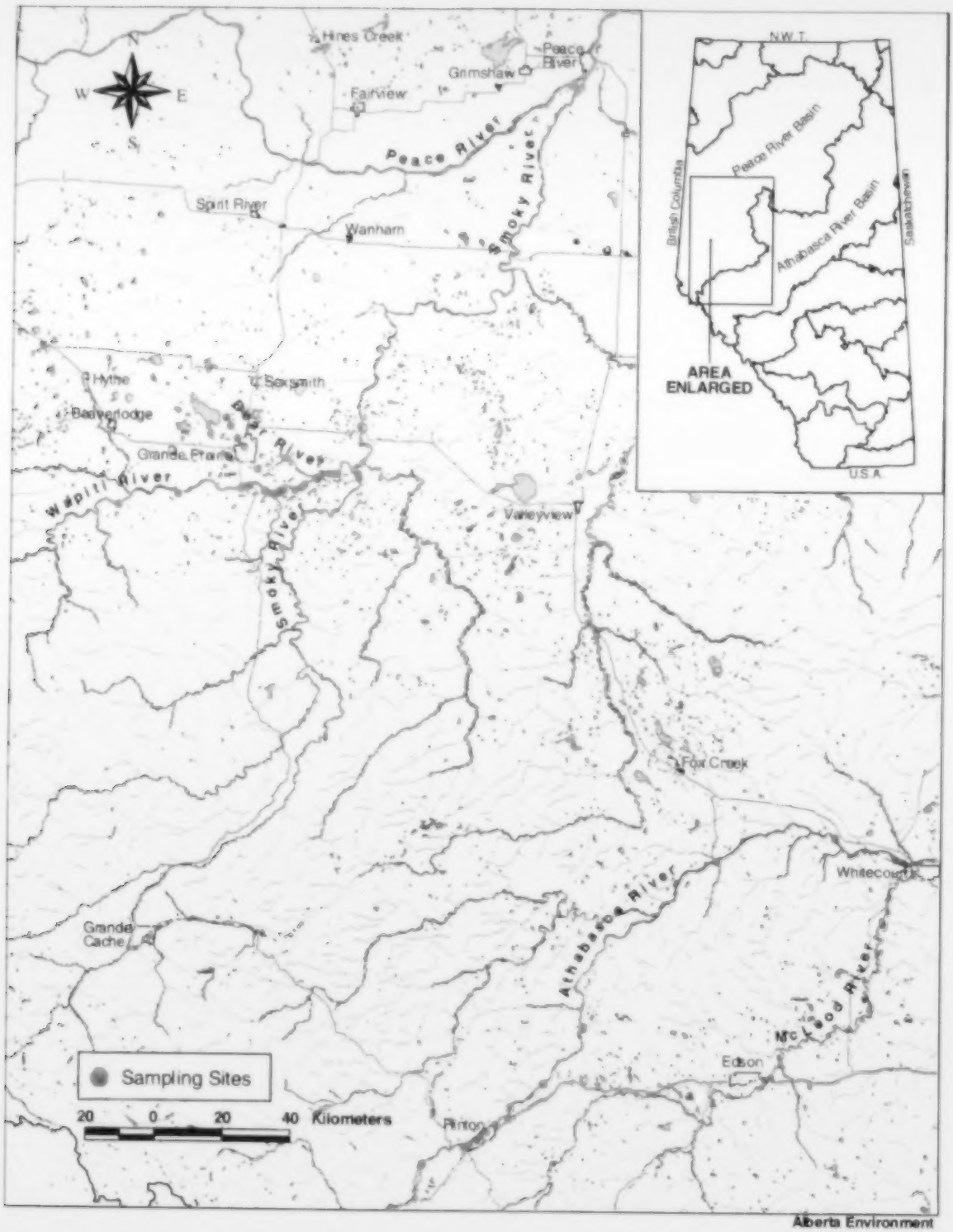

Figure 1 Overview of sediment PCB sampling sites on the Athabasca, Wapiti, Smoky, Bear and Peace rivers, 1989 to 2000

2.0 METHODS

2.1 Study Area

The Athabasca and Smoky-Peace River basins comprise the majority of the land surface area in the northern half of Alberta. The upper Athabasca River is primarily fed by glacial meltwater and runoff from forested areas. Weldwood, a major kraft pulp manufacturing facility, is located on the Athabasca River at Hinton and discharges its treated effluent, combined with municipal effluent, to the Athabasca River. The Wapiti and Smoky rivers are fed by surface runoff from primarily forested catchments, although a major portion of the Wapiti River basin is in agriculture. The city of Grande Prairie is located on the Bear River (Bear Creek), a tributary of the Wapiti River. The city of Grande Prairie discharges its treated wastewater to the Wapiti River upstream of the Bear River, as does Weyerhaeuser, another major kraft pulp processing facility. Average flows for each of the study rivers are given in Table 1.

Table 1 Average flows ($m^3 s^{-1}$) in the Athabasca, Wapiti, Bear, and Smoky rivers

Station Name	Station No.	Average Flow ($m^3 s^{-1}$), by Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Athabasca R at Hinton	07AD002	36.0	32.3	31.9	43.9	177	468	475	355	210	177	59.5	42.2
Wapiti R. nr Grande Prairie	07GE001	14.2	12.5	14.4	82	248	312	197	95.7	70.8	67.7	34.4	19.1
Bear R. nr Grande Prairie	07GE005	0.114	0.088	0.951	4.56	4.40	2.53	2.77	1.36	0.726	0.456	0.293	0.165
Smoky R. nr Watino	07GJ001	51.2	42.8	51.8	351	811	1020	739	424	275	217	111	62.2

2.2 Sampling

Sediment collection and analysis was guided by the findings of the NRBS, and by the location of potential point sources. Sediment sampling in the Wapiti-Smoky River system had been conducted over a ten-year period beginning in 1989 and ending in 1998, with a major collection carried out in 1997 in response to the NRBS findings (Table 2). This included sites on the Smoky and Peace rivers near their confluence. Selected sediment samples collected on the Wapiti, Smoky, and Peace rivers in 1997 were analysed in 1998 to permit initial determination of the magnitude and extent of PCB contamination. Analysis of the 1997 sediment implicated the Bear River as a potential source of PCB contamination, leading to the collection in 1998 of additional samples from the Bear River. The Bear River samples, along with some of the previously archived Wapiti and Smoky River samples from 1989, 1992, and 1997, were analysed in 2000. Sediment sampling in the Athabasca River was conducted in 2000 (Table 2). The location of sampling sites is shown in detail in Figures 2 through 5.

Table 2 Sediment samples analysed from the Wapiti, Smoky, Peace and Athabasca River basins

Site	Latitude	Longitude	Date Sampled	Date Analysed	River km[1]	PCA Designation	Map Designation
Wapiti River							
Highway 40 bridge	55 04'19"	118 48'17"	2-Oct-89	12-Apr-00	43.5	89WR1	W3
d/s Weyerhaeuser haul bridge	55 04'06"	118 42'19"	3-Oct-89	9-Apr-00	35.7	89WR2	W6
Railroad bridge	55 04'30"	118 36'57"	3-Oct-89	9-Apr-00	30	89WR3	W12
10 km d/s Weyerhaeuser haul bridge	55 04'50"	118 32'10"	3-Oct-89	9-Apr-00	22	89WR4	W17
d/s Bear River	55 06'24"	118 28'14"	4-Oct-89	9-Apr-00	16.2	89WR5	W19
10 km u/s Smoky River	55 07'19"	118 24'04"	4-Oct-89	7-May-00	8	89WR6	W23
0.5 km u/s Smoky River	55 08'06"	118 18'30"	4-Oct-89	9-Apr-00	0.3	89WR7	W25
d/s Railroad bridge	55 04'30"	118 36'57"	7-Aug-92	10-Apr-00	30	92WR1	W13
d/s Bear River	55 06'24"	118 28'14"	7-Aug-92	10-Apr-00	16.2	92WR2	W20
u/s Smoky River	55 08'06"	118 18'30"	7-Aug-92	10-Apr-00	0.3	92WR3	W26
u/s Highway 40 (site 1)	55 00'30"	119 21'53"	30-Sep-97	4-Mar-98	85.9		W1
u/s Highway 40 (site 2)	55 02'40"	119 06'02"	30-Sep-97	4-Mar-98	65		W2
u/s Highway 40 (site 3)	55 04'08"	118 48'52"	30-Sep-97	4-Mar-98	43.2		W4
WWTP to Weyerhaeuser CW (site 1)	55 04'40"	118 46'36"	1-Oct-97	19-Feb-00	39.3	97WR1	W5
WWTP to Weyerhaeuser CW (site 2)	55 03'50"	118 42'14"	1-Oct-97	19-Feb-00	34.4	97WR2	W7
Weyerhaeuser CW to FE (site 1)	55 03'49"	118 41'42"	1-Oct-97	19-Feb-00	33.3	97WR3	W8
Weyerhaeuser CW to FE (site 2)	55 03'32"	118 39'39"	1-Oct-97	19-Feb-00	31.6	97WR4	W9
Weyerhaeuser FE to RR br. (site 1)	55 04'05"	118 38'38"	30-Sep-97	19-Feb-00	30.3	97WR5	W11
Weyerhaeuser FE to RR br. (site 2)	55 03'46"	118 38'38"	30-Sep-97	4-Mar-98	30.3		W10
Weyerhaeuser FE to RR br. (site 3)	55 04'19"	118 37'58"	30-Sep-97	4-Mar-98	28.9		W14
RR br. to Bear River (site 1)	55 04'19"	118 37'10"	30-Sep-97	19-Feb-00	28		W15
RR br. to Bear River (site 2)	55 04'21"	118 34'03"	30-Sep-97	4-Mar-98	24.3		W16
RR br. to Bear River (site 3)	55 05'25"	118 31'35"	30-Sep-97	12-Mar-98	19.9		W18
Bear River to Smoky River (site 1)	55 07'06"	118 27'01"	8-Oct-97	19-Feb-00	14.2		W21
Bear River to Smoky River (site 2)	55 07'20"	118 24'57"	8-Oct-97	12-Mar-98	11.1		W22
Bear River to Smoky River (site 3)	55 07'21"	118 22'40"	8-Oct-97	12-Mar-98	4.5		W24
Bear River							
u/s Wapiti River	55 06'28"	118 28'19"	30-Sep-97	12-Mar-98	0.1		B9
u/s Bear River Reservoir (site 1)	55 15'04"	118 54'03"	6-Nov-98	20-Feb-00	51.1	98BR1	B1
u/s Bear River Reservoir (site 2)	55 13'45"	118 52'53"	6-Nov-98	20-Feb-00	47.3	98BR2	B2
u/s Bear River Reservoir (site 3)	55 12'02"	118 50'39"	6-Nov-98	20-Feb-00	41.6	98BR3	B3
Bear River Reservoir	55 10'41"	118 48'50"	9-Nov-98	20-Feb-00	36.7	98BR4	B4
d/s Bear River Reservoir (site 1)	55 07'18"	118 44'31"	6-Nov-98	20-Feb-00	26.3	98BR5	B5
d/s Bear River Reservoir (site 2)	55 09'20"	118 37'07"	6-Nov-98	20-Feb-00	13	98BR6	B6
d/s Bear River Reservoir (site 3)	55 09'17"	118 36'47"	6-Nov-98	20-Feb-00	12.9	98BR7	B7
u/s Wapiti River	55 06'28"	118 28'21"	9-Nov-98	20-Feb-00	0.1	98BR8	B8
Smoky River							
u/s Wapiti River, site 2	55 06'46"	118 16'36"	8-Oct-97	12-Mar-98	208.5		S1
u/s Wapiti River, site 1	55 07'32"	118 17'06"	8-Oct-97	12-Mar-98	205.8		S2
u/s Peace River, site 1	56 08'49"	117 22'05"	6-Oct-97	13-Sep-00	4.26		S3
u/s Peace River, site 2	56 09'36"	117 21'05"	6-Oct-97	13-Sep-00	2.04		S4
Peace River							
u/s Smoky River, site 2	56 10'14"	117 23'14"	6-Oct-97	28-Sep-00	2.69		P2
u/s Smoky River, site 3	56 09'46"	117 23'37"	6-Oct-97	13-Sep-00	3.01		P1
Athabasca River							
d/s Brule Lake (site 2)	53 19'45"	117 50'15"	11-Oct-00	3-Mar-01	186.16		A1
u/s Maskuta Creek (site 2)	53 22'52"	117 39'51"	11-Oct-00	3-Mar-01	174.82		A2
d/s Maskuta Creek (site 1)	53 23'12"	117 38'19"	24-Oct-00	4-Mar-01	172.56		A3
d/s Maskuta Creek (site 2)	53 24'29"	117 35'30"	24-Oct-00	3-Mar-01	168.56		A4
d/s Hinton combined effluent (site 1)	53 26'26"	117 31'26"	11-Oct-00	3-Mar-01	162.95		A5
d/s Hinton combined effluent (site 2)	53 27'37"	117 28'13"	11-Oct-00	3-Mar-01	158.34		A6
d/s Hinton combined effluent (site 3)	53 29'05"	117 27'56"	11-Oct-00	3-Mar-01	155.71		A7
d/s Obed Coal Road (site 1)	53 33'09"	117 19'35"	11-Oct-00	3-Mar-01	142.96		A8
u/s Emerson Bridge	53 41'57"	117 09'41"	11-Oct-00	3-Mar-01	119.74		A9
d/s Emerson Bridge	53 42'17"	117 09'50"	11-Oct-00	3-Mar-01	119.58		A10
u/s Pine Creek (site 1)	54 09'00"	116 35'47"	19-Oct-00	3-Mar-01	42.51		A11
u/s Windfall Bridge (site 1)	54 13'14"	116 04'37"	12-Oct-00	3-Mar-01	0		A12
Happy Creek							
u/s Athabasca River	53 24'00"	117 36'15"	11-Oct-00	3-Mar-01	170.04		Tr1
Hardisty Creek							
u/s Athabasca River	53 25'20"	117 34'10"	24-Oct-00	4-Mar-01	166.83		Tr2

[1]River km measured using 1:50 000 NTS maps. In Wapiti, Smoky, and Bear Rivers, distance was measured from the mouth; in Peace River, from the Smoky-Peace confluence; in Athabasca River and tributaries, from the downstream-most site.

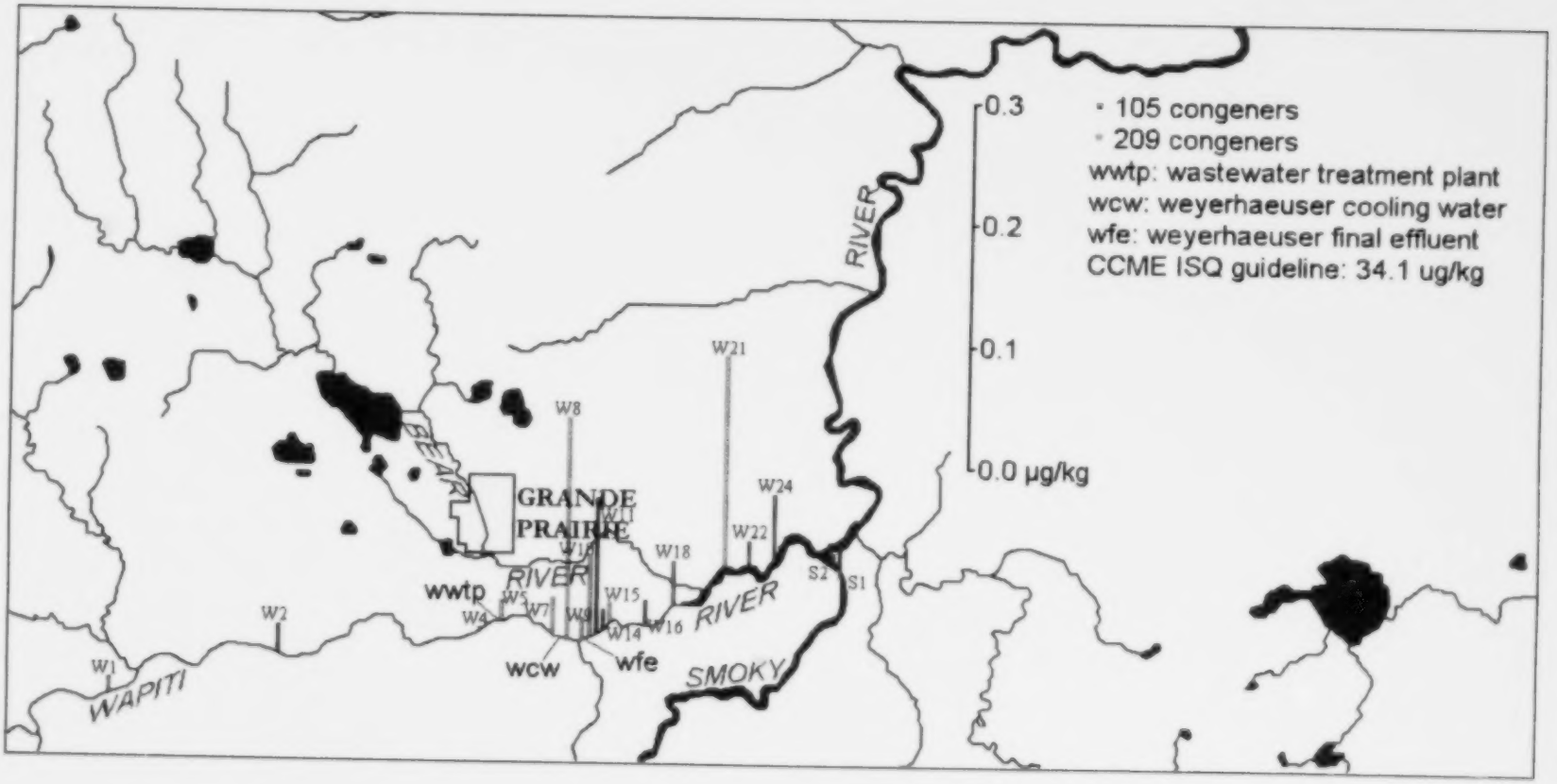

Figure 2 **Sediment ΣPCB concentrations in samples collected in 1997 from the Wapiti and Smoky rivers**

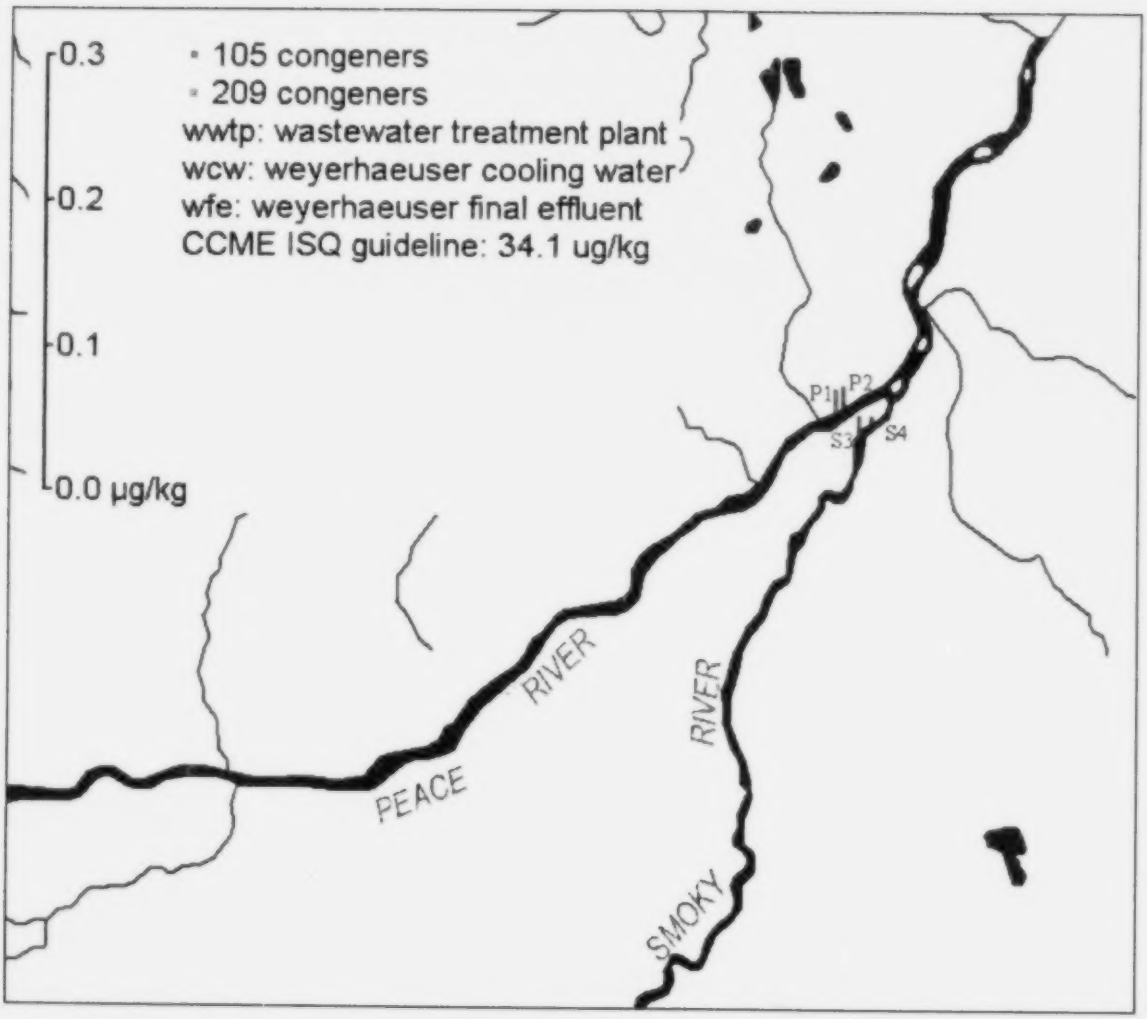

Figure 3 **Sediment ΣPCB concentrations in samples collected in 1997 from the Peace and lower Smoky rivers**

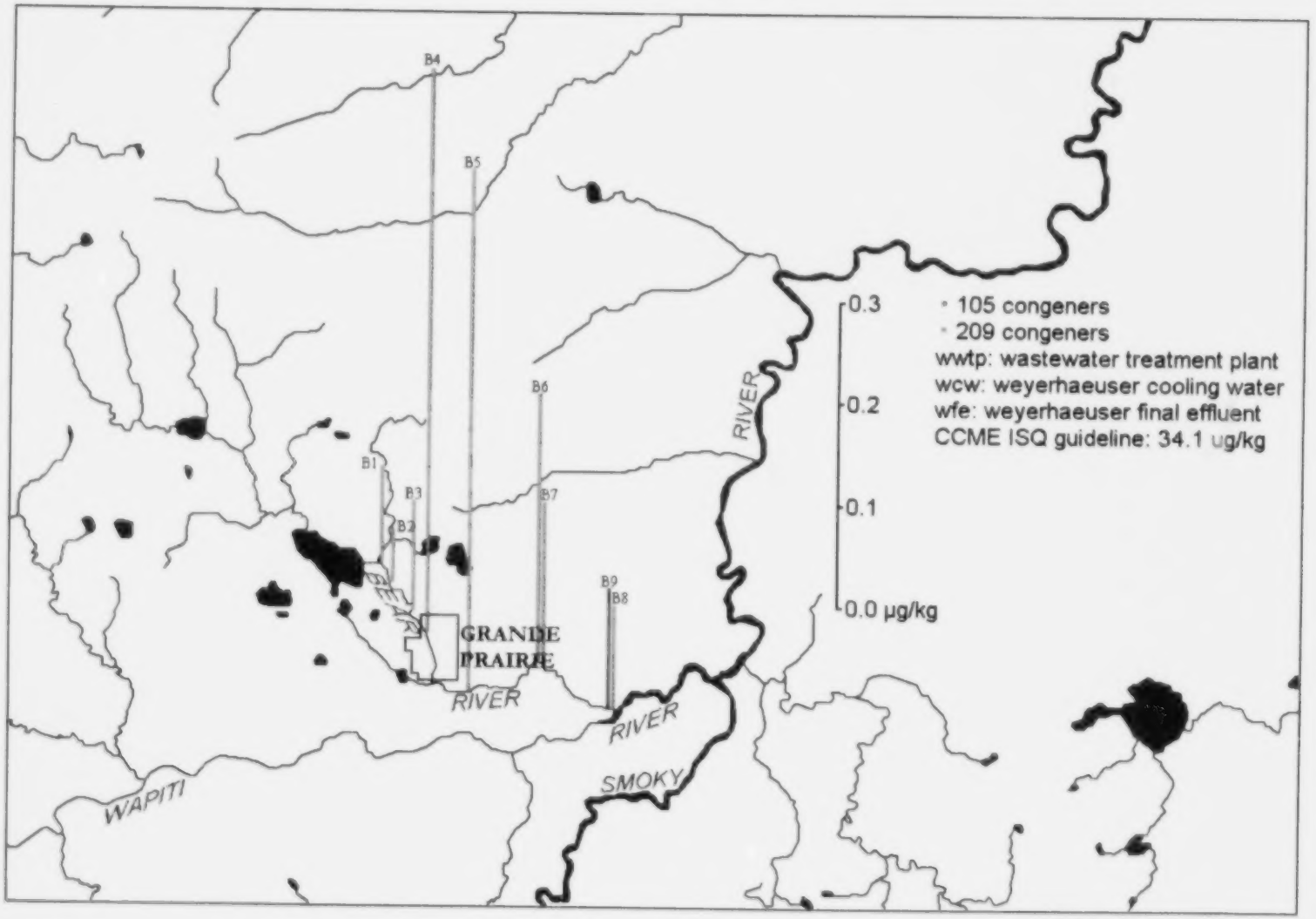

Figure 4 Sediment ΣPCB concentrations in samples collected in 1997 and 1998 from the Bear River

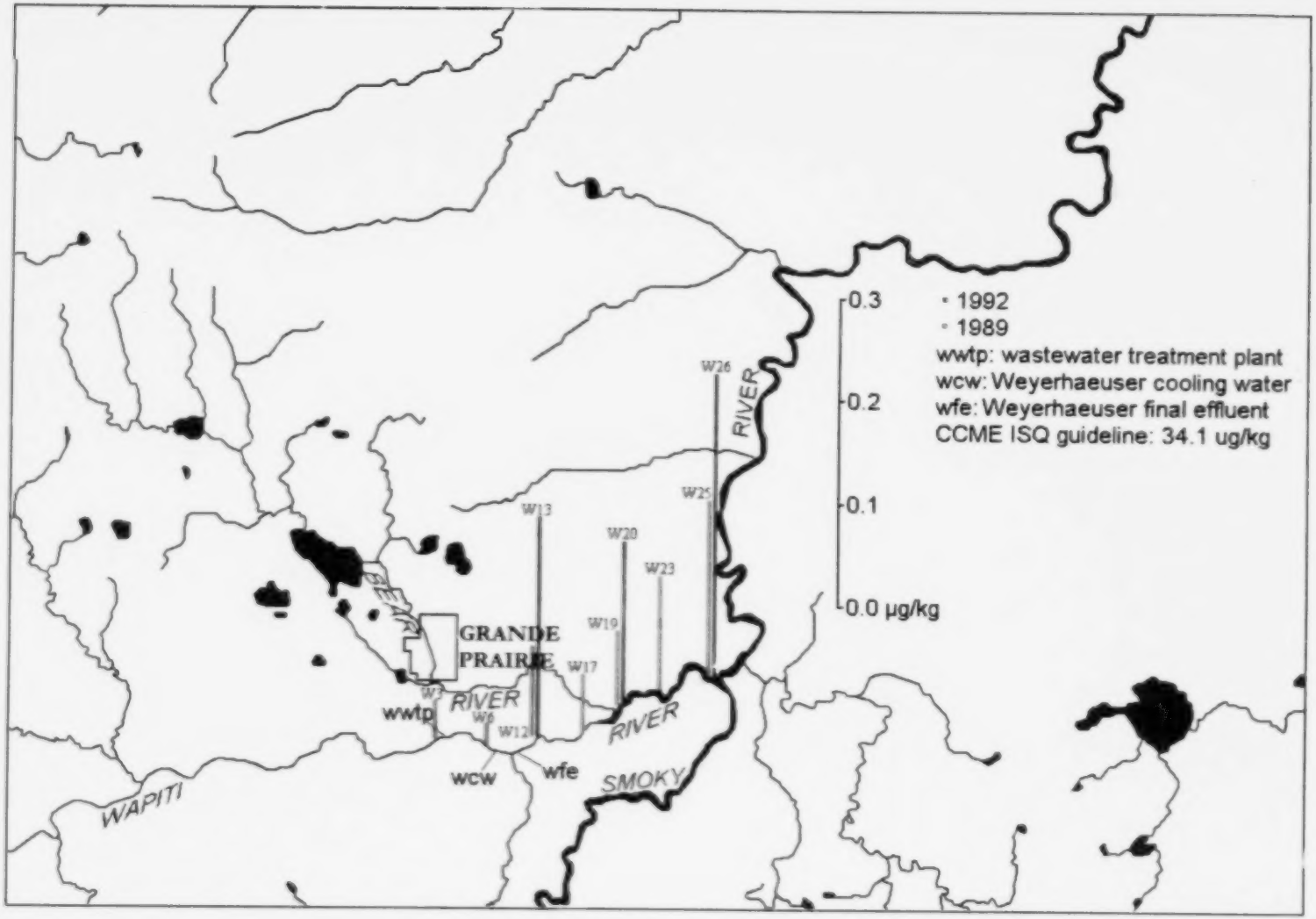

Figure 5 Sediment ΣPCB concentrations in samples collected in 1989 and 1992 from the Wapiti River

Sediment sampling was conducted following standard AENV procedures for the collection of sediments containing trace organic compounds, described in AENV (2002) and Crosley (1996). All sampling equipment was acetone and hexane rinsed, oven dried at 150°C, then washed with river water immediately prior to use. Composite samples comprising a minimum of ten grabs of surface sediments were collected from depositional areas at the sampling sites. The depositional areas varied in size up to about 100 m in length. Samples were collected using a stainless steel scoop and bucket, mixed to homogeneity, and transferred to four pre-cleaned (USEPA protocol) 500 ml glass jars with Teflon cap liners. Areas of fine sediment accrual were sampled preferentially, in water that ranged to a depth of 50 cm. Samples were placed in an ice-filled cooler, and stored below -10°C upon return from the field.

2.3 Sample Handling and Analysis

2.3.1 PCBs

PCB analyses for all samples were carried out by Axys Analytical Services Ltd. (Sidney, British Columbia) using gas chromatography – high resolution mass spectrometry (GC-HRMS). Sample PCB congener concentrations are reported on a dry weight basis. Because analysis of the selection of samples collected in 1997 from the Wapiti and Smoky rivers was carried out at an earlier date and by a slightly different method, the resolution of individual congeners (69 resolved, 36 unresolved: the '105 congener' analysis) is not as complete as for those samples that were analysed more recently (125 resolved, 84 unresolved: the '209 congener' analysis). Nonetheless, detection limits were similar between the two. The following method description pertains to the earlier analysis, and is followed by a description of the method used in the analysis conducted in 2000/2001; a detailed description of the earlier method is provided in Axys (1997).

2.3.2 1998 Analyses (105 congeners)

A sediment subsample is spiked with a standard solution containing ^{13}C labelled surrogates: hexachlorobenzene, PCB 101, PCB 105, PCB 118, PCB 180, and PCB 209 for quantification of Arochlors and ortho- congeners, and ^{13}C labelled PCB 77, PCB126, and PCB 169 for quantification of coplanar congeners. A separate subsample is taken for gravimetric moisture determination. The spiked subsample is extracted twice with 1:1 dichloromethane:methanol, back extracted with extracted distilled water, and dried over anhydrous sodium sulphate. The concentrated extract is loaded on a Florisil column, and eluted with hexane followed by 15:85 dichloromethane:hexane. The eluents are combined, concentrated, and spiked with a ^{13}C labelled PCB 153 recovery standard.

Ortho- PCB congeners are analysed using either a VG 70 or a VG Ultima AutoSpec mass spectrometer equipped with a Hewlett Packard 5890 gas chromatograph (selected ion monitoring (SIM) mode), a DB-5 capillary chromatography column (60m, 0.25mm i.d. x 0.1 mm film thickness) and a CTC auto sampler. Data are acquired in the SIM mode to enhance sensitivity. Linearity of instrumental response is verified by initial analysis of multiple calibration solutions covering the working response range of the instrument; daily instrumental calibration is performed every 12 hours using a single standard solution. The PCB congeners are quantified by

the isotope dilution/internal standard method against the 13C-labeled surrogates added prior to analysis. This calculation procedure yields final concentrations that are corrected for any losses that occurred during the analysis procedure.

Analysis for coplanar PCB congeners (PCB 77, PCB 126, and PCB 169) requires additional elution of the previously analysed extract on a carbon/celite column. The sample is eluted with 1:1 cyclohexane/dichloromethane followed by ethylacetate, which is discarded. The coplanar fraction is then recovered by elution with 1:1 toluene:ethylacetate, dried, and re-dissolved in hexane. The hexane extract is loaded on an alumina column and eluted with hexane, which is discarded. The column is eluted with 1:1 hexane:dichloromethane, which is then concentrated to dryness and spiked with a ^{13}C labelled PCB 153 recovery standard. Quantification for coplanar PCBs proceeds as for ortho- PCBs.

2.3.3 2000-01 Analyses (209 congeners)

PCB analysis of the remaining samples from the Wapiti, Smoky, Bear, and Athabasca rivers was conducted by Axys Analytical Services Ltd. following United States Environmental Protection Agency (USEPA) method 1668, revision A (USEPA 1999). A sediment subsample is ground with sodium sulphate, spiked with ^{13}C labelled surrogate standard solution and extracted with 80:20 toluene:acetone. A separate subsample is taken for gravimetric moisture determination. The raw extract is spiked with cleanup standard, reduced to just dryness, and re-dissolved in hexane. The hexane extract is loaded on a Florisil column and eluted with hexane followed by 15:85 dichloromethane:hexane. The combined eluates are concentrated, the solvent is changed to hexane and treated with activated copper. This extract is loaded on a partially deactivated alumina column, washed with hexane and eluted with 1:1 dichloromethane:hexane, and concentrated. This extract is loaded on a layered silica gel column and eluted with hexane. The eluate is concentrated and treated with copper, and spiked with a ^{13}C labelled recovery standard. Quantification for coplanar PCBs proceeds as for ortho- PCBs, except that chromatographic separation occurs on an SPB-Octyl chromatography column (30 m, 0.25 mm i.d. x 0.25 µm film thickness).

2.3.4 Particle Size and Organic Carbon

Particle size and total organic carbon content determination was carried out by Soilcon Laboratories Ltd., under subcontract to Axys Analytical Services Ltd. Sediment particle size fractions are reported on a percent basis, by weight, utilizing the pipette method. The air-dried sediment sample is sieved to separate gravel from the <2.00mm fraction. The size of particles of <2.0 mm is determined from the settling rates of particles in aqueous suspension. The <2.0 mm fraction, from which organic matter has been removed using hydrogen peroxide, is re-suspended in a sodium pyrophosphate (a dispersant) solution. The sample is mixed, and sub-samples withdrawn by pipette at pre-determined intervals. The sub samples are dried and weighed. The size of particles in the dried sub-samples is determined from the time and depth interval at which they were withdrawn from the sample (Day 1965).

Sediment organic carbon content is determined by combustion following the removal of carbonates using a 20:1 solution of 1 N H2SO4 and FeSO4. The sample is combusted in an

oxidizing atmosphere and the evolved CO2 analysed using a high temperature induction furnace Leco analyser (Nelson and Sommers 1982).

2.4 Analytical Quality Assurance

Duplicate splits of nine samples were analysed to establish the extent of variance in sample preparation and analysis. Preparation of duplicate samples occurred either in the field by sub-sampling of a well-mixed composite sample, or in the lab following sample homogenisation. Field-prepared duplicate splits were usually submitted blind. For inter-lab comparison, three of the duplicate samples from the Athabasca River were sent to Environment Canada's National Water Research Institute (NWRI) in Burlington, Ontario.

Analytical QA/QC (Quality Assurance/Quality Control) was conducted by the batch method. Each sample batch was prepared and analysed jointly, with accompanying QC samples. QC samples comprised procedural blanks, duplicates, and surrogate standards. Recovery of 40% to 120% of surrogate standards was acceptable by Axys' criteria. Congener values were not corrected for procedural blanks or recovery.

2.5 Statistical Analysis

2.5.1 Nondetected/Nonquantified Congener Values

Analytical detection levels for individual congeners are calculated on a per-sample basis. PCB congener concentrations that fall below the analytical detection level are not reported, and are treated as zero values.

PCB concentrations that do not meet quantification criteria but are above the analytical detection level are reported by AXYS Analytical Services Ltd. (Sydney, British Columbia), but flagged. This approach is a departure from the USEPA method 1668, revision A (USEPA 1999) in which these values are not reported, however it is the position of AXYS Analytical Services Ltd. that because these values can be significantly above the analytical detection level, it is prudent to report them. Our approach in reporting these values is to exclude them from ΣPCB calculations, but to include them in analyses such as rank sum comparisons and principal components where variance structure must be retained.

2.5.2 Principal Components Analysis

The congener signature of sediment PCBs is examined using standard principal components analysis (PCA; Canoco v. 4.02). The PCA technique is conceptually similar to linear regression, although the distance measure used in PCA differs from the squared variance measure typically used in regression analyses. As has been done elsewhere (e.g. Macdonald *et al.* 1998), the PCA technique is used here to compare the congener profile of sediment samples as an indication of the potential PCB contaminant sources.

Principal components analysis is a method of constructing unconstrained (i.e., no explicit explanatory variables), theoretical gradients (PC axes) according to maximum internal

variability. Gradient response is assumed to be linear. Analysis using PCA was selected based on an initial determination of gradient length using Canonical Correspondence Analysis (CCA), a related ordination technique. Congener data were log transformed in order to moderate the influence of dominant congeners. The differing resolution between the methods employed in the analysis of PCBs from sediment samples collected in 1997 precludes the inclusion of the 105 congener samples with the 209 congener samples. Therefore, the 105 congener samples were not included in the PCA.

2.5.3 Split Sample Comparisons

Sample comparisons were performed using the relative standard deviation (RSD) as a measure of variability between paired data for individual PCB congeners. The RSD is equivalent to the coefficient of variation, that is, the standard deviation divided by the mean, expressed as a percentage. The advantage to this approach is that it is sensitive to relative pair-wise differences, rather than absolute differences. This is consistent with the absolute variability expected of analytical data, which is expected to vary according to the concentration of the analyte. To permit general comparison of replicate samples, the average RSD is calculated for all congener pairs. Congener values that do not meet quantification criteria are retained, while below detection limit data are not considered. The RSD approach is also used to compare PCBs in the aqueous fractions.

3.0 RESULTS AND DISCUSSION

3.1 General

Analytical results for sediment PCB concentrations are compiled in Appendix A. Analytical results for sediment TOC content and particle size are compiled in Appendix B. Full analytical reports, including QA/QC results, are filed with AENV.

3.2 Quality Assurance

Analytical results met Axys's criteria for duplication, surrogate standard recovery, and procedural blanks.

The analytical precision among the five sets of split samples for the Wapiti- Smoky-Peace system (Table 3) was generally very good. With the exception of the Peace River sample, all replicates fall below a 20% relative standard deviation (RSD) threshold. This indicates that on average, there is little difference among congeners in sample replicates. Although the sample collected from the Peace River above the Smoky River exceeds the 20% threshold, only three congeners were analysed in the duplicate sample, of which only two were above the analytical detection level. In addition, the reported concentrations are very small, such that while the relative difference is large, the absolute difference is negligible (0.0001 µg/kg).

Because the RSD values reported in Table 3 are average values, they are not sensitive to the occurrence of a few large differences between individual congeners. However, it is clear from the sum of congeners that overall, the absolute difference between samples is small. As well, the reporting of the RSD as a percentage is misleading, as it is possible to achieve values of greater than 100 percent, given a sufficiently large variance.

The duplicate sample prepared for the Athabasca River downstream of the Hinton combined effluent differs significantly from its counterpart (RSD=63.2%), probably due to insufficient mixing of the sample in the field prior to sub-sampling. A similar discrepancy appears in the organic carbon content (TOC) of these duplicate samples, indicating that the parent sample was not homogeneous.

Three duplicate Athabasca River sediment samples were sent to the Environment Canada National Water Research Institute (NWRI) in Burlington, Ontario for analysis. These samples were analysed in 2003 for a suite of 106 PCB congeners. There is generally poor agreement between ΣPCB concentrations in samples analysed by Axys Analytical Services Ltd. and the NWRI duplicate samples. This could be due to higher analytical detection limits at the NWRI lab, or to background contamination. In the samples analysed at the NWRI, levels of PCBs detected in the lab blank (ΣPCB of 97.2 µg/L) are greater than in the sediment samples (ΣPCB of 57.9 µg/L u/s Maskuta Cr.; 36.3 µg/L Hardisty Cr.; 44.9 u/s Emerson Br.), suggesting that the analyses conducted by Axys are more sensitive. Nonetheless, for the sample with the highest PCBs in this study (Hardisty Creek), both labs report similar concentrations (3.2 and 2.3 µg/kg – Table 3). The RSD approach to inter-sample comparisons was not used here, as co-eluents differed among the analytical approaches used in the two labs.

Table 3 Duplicate samples collected for analytical quality assurance

Site Name (Map Designation)	Date Collected	Date Analysed	Lab	Type[1]	Σ Congeners[2] (µg/kg)	No. Congeners Resolved	RSD[3] %	n[4]
Bear River d/s Bear R. Reservoir, site 1 (B5)	6-Nov-98	20-Feb-00	Axys	L	0.514	159	10.5	91
duplicate		20-Feb-00	Axys	L	0.517	159		
Bear River Reservoir (B4)	9-Nov-98	20-Feb-00	Axys	F	0.571	159		
duplicate a		19-Feb-00	Axys	F	0.540	159	15.4	82
duplicate b		19-Feb-00	Axys	F	0.566	159		
Wapiti River u/s Hwy. 40, site 2 (W2)	30-Sep-97	4-Mar-98	Axys	L	0.023	87	19.4	4
duplicate		4-Mar-98	Axys	L	0.001	87		
Smoky River u/s Wapiti, site 2 (S1)	8-Oct-97	12-Mar-98	Axys	L	0.022	87	6.0	6
duplicate		12-Mar-98	Axys	L	0.009	87		
Smoky River u/s mouth, site 2 (S4)	6-Oct-97	13-Sep-00	Axys	L	0.005	86[6]	14.6	11
duplicate		13-Sep-00	Axys	L	0.012	86[6]		
Peace River u/s Smoky River, site 3 (P1)		13-Sep-00	Axys	L	3.000×10^{-4}	3[5]	28.3	2
duplicate		13-Sep-00	Axys	L	4.000×10^{-4}	3[5]		
Athabasca River d/s HCE, site 1 (A5)	11-Oct-00	4-Mar-01	Axys	F	0.872	159	65.1	96
duplicate		3-Mar-01	Axys	F	0.170	159		
Athabasce River u/s Mas uta Cr. (A2)	11-Oct-00	3-Mar-01	Axys	F	0.151	159		
duplicate		3-Mar-01	NWRI	F	3.660	106		
Hardisty Creek (Tr2)	24-Oct-00	4-Mar-01	Axys	F	3.203	159		
duplicate		4-Mar-01	NWRI	F	2.340	106		
Athabasca River u/s Emerson Br. (A9)	11-Oct-00	3-Mar-01	Axys	F	0.447	159		
duplicate		3-Mar-01	NWRI	F	4.520	106		

[1]indicates whether duplicate was prepared in field (F) or in lab (L)
[2]excluding congeners that do not meet quantification criteria
[3]Relative standard deviation
[4]number of congeners detected
[5]Only coplanars (PCB 77, 126, 169)
[6]Excluding coplanars (PCB 77, 126, 169)

Preparation of the sediment samples requires that the supernatant that collects during storage be decanted/filtered and discarded prior to extraction. This would introduce a potential source of measurement error, if a significant amount of PCBs were to reside in the aqueous fraction of the whole sample. Separate analyses were therefore performed on the aqueous phase of three Athabasca River sediment samples, to ensure that PCBs would not be lost during the sample preparation process. The supernatant from three samples (Brule L. (site 2); AR d/s HCE (site 2); AR u/s Windfall Br.) was extracted and analysed using the United States Environmental Protection Agency (USEPA) method 1668, revision 'A' (USEPA 1999). The average relative standard deviation (RSD) for all congener pairs was used to compare aqueous samples with a lab blank, retaining values that are below the limit of quantification and excluding all <DL values. All sum PCBs for aqueous samples fell below the sum for the blank (Table 4). As well, the average RSD for aqueous-blank congener pairs is relatively high for all aqueous samples, indicating the aqueous samples were quite different (lower) than the blank. This indicates that no significant amount of PCB was lost in the aqueous phase during sample preparation.

Table 4 **Comparison of the aqueous fraction of sediment samples with the lab blank, and of the lab blank with all three samples, using the relative standard deviation (RSD)**

Site Name	Σ PCB (pg/L)	No. Congeners Resolved	RSD[1] %	*n*
Brule Lake (site 2)	389.5	159	31.4	12
Athabasca River d/s Hinton combined effluent (site 2)	673	159	26.0	27
Athabasca River u/s Windfall Bridge (site 1)	501.4	159	30.0	16
Blank	1643.11	159		

[1]Relative Standard Deviation

3.3 Wapiti, Bear, Smoky, and Peace Rivers

Peace River. Sediment PCB concentrations in the Peace River upstream of the Smoky River confluence are at or near detection levels, with ΣPCB concentrations not exceeding 0.163 µg/kg (Peace River u/s Smoky River - site 3). These concentrations are very similar to those at sites in the adjacent lower Smoky River (Figure 3). This is in contrast to earlier findings of the Northern River Basins Study (NRBS 1996; Crosley 1996), which indicated elevated PCB levels in Peace River sediments. PCB levels in the clay-silt fraction of bottom sediments in the Peace River upstream of the confluence with the Smoky River were measured during the NRBS. The concentration of Aroclor 1254 in Peace River sediments (48 µg/kg) was an order of magnitude higher than in sediments from all other study sites in the Peace and Athabasca River basins. The concentrations of Aroclor 1242 (6.6 µg/kg) and PCB 77 were also the highest recorded during the NRBS. In contrast, samples collected for the NRBS from the lower Smoky River had much lower PCB concentrations (Aroclor 1254 = 1.9 µg/kg; Aroclor 1242 = 0.94 µg/kg; PCB 77 = 1.5 µg/kg). The cause of this discrepancy is not known, although in view of the results from the present study and the similar findings of both studies for the lower Smoky River, the NRBS findings for the Peace River may be anomalous.

Smoky River. Sediment PCB concentrations in the Smoky River upstream of the Wapiti-Smoky confluence (Figure 2) are at or near detection levels, and probably reflect inputs from atmospheric deposition. Sediment PCB concentrations in the Smoky River upstream of the confluence of the Peace and Smoky Rivers are very low, and are consistent with those in the Smoky River upstream of the Wapiti-Smoky confluence. Slightly elevated PCB levels observed in the Wapiti do not appear to extend through to the lower Smoky River. Sediment PCB levels in the Smoky River are similar to apparent background levels in the upper Wapiti and in the Peace rivers.

Bear River. Upstream of Grande Prairie, sediment ΣPCB concentrations are low (<0.110 µg/kg) but consistently above apparent background levels for the Wapiti and Smoky rivers (Figure 4). The reason for this apparent discrepancy is unclear. However, a study of sediments in three tributaries to the Athabasca and Smoky Rivers, the Sakwatamau, Freeman, and Little Smoky rivers, found ΣPCB concentrations of 0.258 µg/kg, 0.283 µg/kg, and 0.246 µg/kg, respectively (Gabos et al. 2001; Ikonomou et al. 1999). The ΣPCB concentrations found in the sediments of

these rivers are approximately double the concentrations found in sediments of the Bear River upstream of Grande Prairie. None of the three tributaries to the Athabasca River are subject to effluent discharge from urban or heavy industry sources, although all are within approximately 150 km of the hazardous waste treatment facility at Swan Hills, where PCB contaminated materials are incinerated. Whether the Sakwatamau, Freeman, and Little Smoky rivers are subject to the same ambient loads as the Wapiti, Smoky, and Bear rivers is unclear, although Ikonomou et al. (1999) note that the ΣPCB concentrations found in these rivers are consistent with levels reported for surface sediments in arctic lakes, and consider them as background. Inter-sample differences between the three Bear River samples collected upstream of Grande Prairie are insignificant (P>95%) by the Wilcoxon-Mann-Whitney test, indicating an absence of any contaminant gradient.

Within Grande Prairie, the first site is in the Bear River reservoir, where sediments show significantly higher levels of PCB contamination than the three upstream sites. This could potentially be due to the deposition in the reservoir of entrained particles containing adsorbed PCB residues from unidentified upstream sources. Particulate organic matter (TOC) and fine particles of <0.053 mm (silt and clay) comprise a larger fraction of samples collected in the Bear River Reservoir than samples collected at downstream sites (Appendix B), indicating that fine suspended particles are retained within the reservoir. This has contributed to a substantial accumulation of sediment in the reservoir, such that its design capacity has become reduced. While PCB levels in the Bear River Reservoir sediments (avg. ΣPCB=0.559 µg/kg) are the most elevated of all sites in the Bear and Wapiti River basin, they fall well below the CCME ISQ guideline (34.1 µg/kg).

Sediments directly downstream of the Bear River Reservoir exhibit similar levels of PCB contamination (ΣPCB=0.514 µg/kg) to reservoir sediments, with significantly higher concentrations than the three most upstream sites. Contamination in the Grande Prairie area may originate from unidentified localised sources. PCB concentrations at the three subsequent sites decline uniformly to levels (0.118 µg/kg 1997; 0.101 µg/kg 1998) at the most downstream site that are comparable to those found at sites upstream of the reservoir (Figure 4).

Wapiti River. Relative levels of sediment PCB contamination are illustrated in Figures 2 and 5 as the sum of PCB congeners that n.. t quantification criteria. Sediment PCB concentrations in the Wapiti River are generally low (ΣPCB<0.300 µg/kg), with all measured concentrations falling well below the CCME interim sediment quality guideline (ISQG; 34.1 µg/kg). Of the fourteen samples analysed in 1998, only three were above the more elevated of the two laboratory blank concentrations (0.037 µg/kg), indicating negligible PCB levels in the remaining samples. One of these was collected at the mouth of the Bear River (0.119 µg/kg), one downstream of the pulp mill (0.113 µg/kg), and the remaining sample was collected below the confluence of the Bear and Wapiti Rivers (0.0367 µg/kg).

Effluents discharged directly to the Wapiti River constitute potential point sources of PCB contamination. Therefore, sediment PCB concentrations are discussed relative to the locations of these effluents. The Grande Prairie wastewater treatment plant (WWTP), located downstream of the Highway 40 bridge, and the Weyerhaeuser bleached kraft pulp mill (WFE), located downstream of the haul bridge, are the two primary sources of treated effluent discharge into the

Wapiti River (Figures 2 and 5). The Weyerhaeuser storm drain and cooling water outflow (WCW) may have been a potential point source in the past, although it does not discharge process effluent, and storm drainage is no longer released there.

Upstream of the pulp mill, sediment PCB concentrations are low and are consistent with apparent background levels for the Smoky River. Although variable detection levels and analytical methods preclude direct comparison of samples collected in 1989 and 1997, ΣPCB concentrations in all four samples fall below 0.038 µg/kg (Wapiti River at Hwy 40, 1989). In 1997, the difference between ΣPCB concentrations from sites located upstream of the wastewater treatment plant effluent (WWTP) and sites on the Smoky River upstream of the confluence with the Wapiti River is insignificant by the Kruskall-Wallis rank sum test (P = 95%), indicating that any PCB contamination of these samples probably represents inputs from atmospheric deposition.

Sediment PCB levels in samples collected between the Grande Prairie wastewater treatment plant (WWTP) and the Weyerhaeuser storm drain and cooling water discharge (WCW) all fall below apparent background levels, with little variability. It is therefore unlikely that the effluent from the wastewater treatment plant is a source of contamination. PCB levels in sediment collected upstream of the cooling water outflow following the 1978 release of Askarel into the Wapiti River were reported to be as high as 2.2 µg/kg (Pledger 1981), far in excess of any samples collected in either the Wapiti or the Bear River during the present study. Whether these levels indicate contamination from an upstream source or reflect the analytical capability of the day is unclear. Analytical methods at the time of the Askarel spill lacked the sensitivity and accuracy of current methods. No potential point sources have been identified upstream of the pulp mill.

PCB levels in the two samples collected between the pulp mill storm drain/cooling water discharge (WCW) and the pulp mill process effluent discharge (WFE) are variable. The ΣPCB concentration directly downstream of the cooling water discharge (0.182 µg/kg) is the highest recorded in the Wapiti River during the 1997 survey. However, there is no record of a release of PCBs from the outflow to identify it as the contaminant source. PCB levels at the second site, located further downstream of the cooling water discharge, are consistent with apparent background concentrations for the basin, and fall below the associated laboratory blank concentration (0.027 µg/kg).

The observed variability in PCB concentrations may be due to differing depositional characteristics at these two sites. Sediment from the site directly below the cooling water outflow contains a greater proportion of sandy (2.00 mm > Ø >0.053 mm) material, while sediment from the second site comprises more silt/clay (Ø < 0.053 mm; Appendix B). While smaller particles have a greater capacity to adsorb PCB residues due to their proportionately greater surface area, the presence of small particles may also indicate a greater rate of deposition at the site, effectively leading to the dilution of contaminants. It is possible that a greater depositional rate at the second site tends to dilute PCB concentrations, if PCBs are indeed present at that site.

Samples collected between the pulp mill final effluent (WFE) and the confluence of the Wapiti and Bear Rivers contain PCB levels in excess of apparent background levels (Figures 2 and 5). This likely reflects point source contamination from the pulp mill area, potentially from the release of Askarel into the Wapiti River in 1978. Sediment samples collected in the Wapiti River downstream of the final effluent out-fall following the spill had sediment PCB concentrations of as much as 44 µg/kg (Pledger 1981). This value exceeds the CCME interim sediment quality guideline of 34.1 µg/kg, however it may include error introduced by the less accurate analytical techniques available at the time of sampling.

Temporal trends in sediment PCB levels are indeterminate. Although PCB levels in samples collected in 1997 appear to have declined from those collected in 1992 (Figures 2 and 5), there appears to be an increase in sample PCB concentrations from 1989 to 1992. Apparent trends in sediment PCB levels are more likely due to the accrual and erosion of overlying sediments than to the flushing of contaminated sediments. Given the vertical mobility of PCBs in sediment (Gunkel and Nolte 1994), it is possible that once sediments receive a significant input of PCBs, it may take considerable time before they are flushed from the system.

Sites from the Bear River to the confluence of the Wapiti and Smoky Rivers show variable ΣPCB levels ranging from 0.020 µg/kg (105 congeners) to 0.216 µg/kg (209 congeners). PCB levels appear to be highest at the mouth of the Wapiti River, potentially reflecting the depositional environment there. Conversely, PCB levels in the Wapiti near the mouth of the Bear River are relatively low. The range of PCB levels is greater below the Bear River than in upstream reaches of the Wapiti River, indicating potential contributions from the Bear River.

3.4 Wapiti-Bear River Sources

PCB congener values were compared among samples using principle components analysis (PCA), a method that extracts variance to help in the interpretation of component patterns. PCA provides a means of reducing the complexity of the data by presenting only the dominant relationships, and is conceptually similar to linear regression. The PCA biplot (Figure 6) is a diagram that aids in the visual representation of the PCA results. Only samples with the full suite of 209 congeners were analysed. The identity of samples in the PCA biplot is given in Table 2. Individual congeners have been omitted from the diagram to simplify interpretation.

Most sediment samples from the Wapiti and Bear Rivers sort into three groups based on their PCB congener profiles: (A) sites located upstream of the pulp mill; (B) sites located between the pulp mill and the Bear River; and (C) sites located along the Bear River. The site located below the confluence of the Wapiti and Bear rivers (97WR7) shares characteristics of groups B and C. Two sites (97WR4 and 97WR6) are not consistent with this general pattern and sort with the upstream group (A), probably as a result of local depositional properties. These two sites also have low ΣPCB concentrations, consistent with sites that characterise apparent background.

The grouping of sampling sites according to river and reach indicates a distinct contaminant origin in each area. More important, however, is the separation of upstream from downstream sites in the Wapiti River, suggesting that the upstream sites represent an un-impacted or background condition. The fact that samples collected over a longer timescale (1989, 1992,

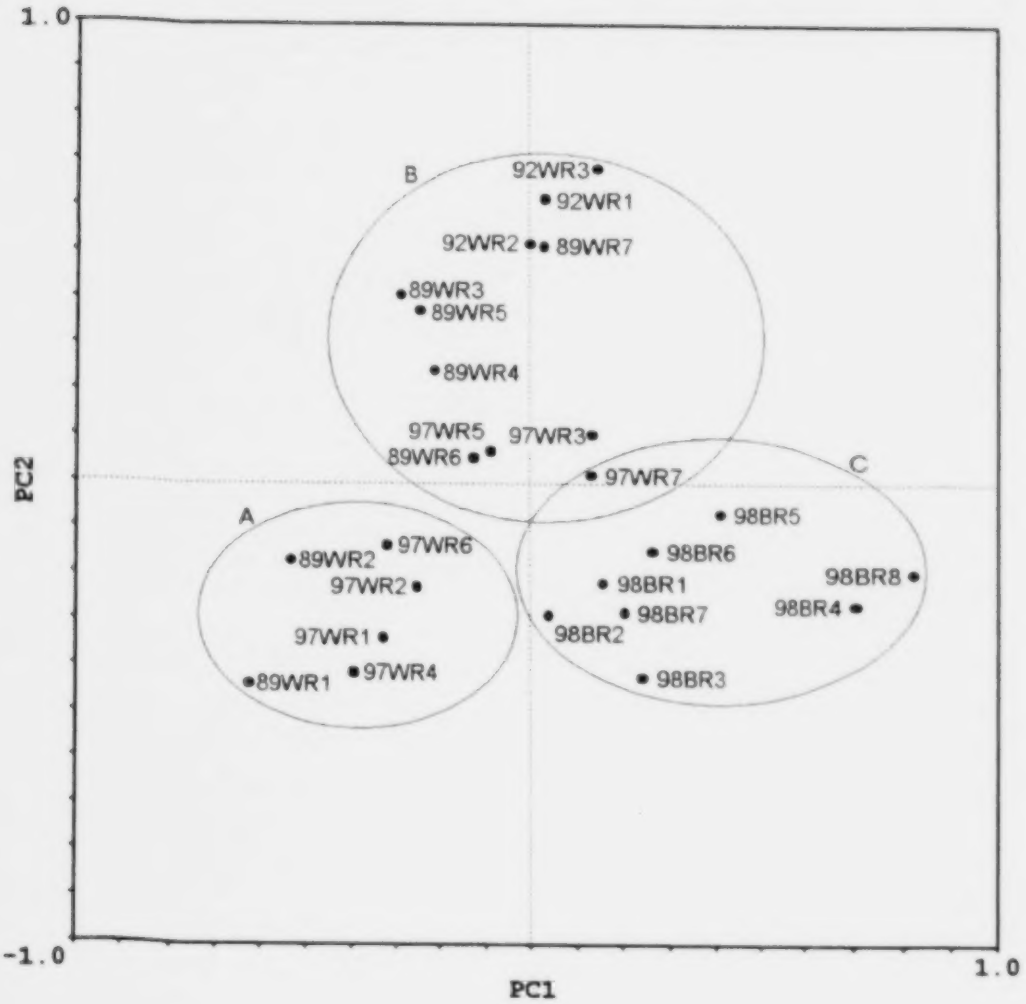

Figure 6 **Principal components analysis (PCA) biplot of Wapiti and Bear River sediment PCBs, showing first two principal components (PC1 and PC2)**

Samples are grouped based on similarities in congener signatures: (A) Wapiti River background; (B) Wapiti River below pulp mill; (C) Bear River. The identity of sample labels is given in Table 2.

1997, and 1998) segregate in a consistent manner also lends support to this conclusion. The grouping of sample 97WR3 with other 'downstream' samples suggests a common contaminant source.

An accidental release of approximately 1300 L of Askarel occurred at the Weyerhauser (formerly Proctor and Gamble) pulp mill in 1978 (Pledger 1981; Kostler 1981). Askarel is a generic name for a class of synthetic liquids containing a proprietary mixture of PCB (40-60%) and trichlorobenzene that was commonly used as an electrical insulating liquid. The PCB contained in the Askarel released from the pulp mill was Aroclor 1254, which reached the Wapiti River through the process effluent treatment system. The system consists of a clarifier, an aerated lagoon, a settling basin, and a foam pond. Contaminated sediments contained within the treatment system were removed to the pulp mill's secured chemical landfill site. An unknown volume of Askarel was not recovered.

The release of Aroclor 1254 is consistent with Aroclor-specific analyses (Aroclors 1242, 1254, 1260) conducted on the first batch of samples collected in 1997 and analysed for 105 congeners (Appendix A2). Only Aroclor 1254 was detected upstream of the confluence with the Bear River, at a concentration of 0.05 µg/kg. The Aroclor evidence in conjunction with the PCA analysis provides an indication that at least some of the PCBs detected in Wapiti River sediments upstream of the Bear River are derived from the 1978 spill.

The PCB spill at the pulp mill is the only documented release of PCBs into the Wapiti River. Although the documented mode of release of Askarel into the river was via the final effluent, there is evidence of PCB contamination in sediments collected between the cooling water/storm sewer outflow and the final effluent outflow. This reach was not sampled by Pledger (1981) following the 1978 spill. Whether the spill could have resulted in the release of Askarel into the cooling water/storm sewer outflow is unclear. A release of PCB-contaminated material that occurred at the pulp mill in 1974 (Alberta Environment 1999) could constitute an additional source, although it is not believed to have reached the Wapiti River.

The potential origin of PCB contamination in the Bear River basin is unclear, although several locations have been identified as having been contaminated or potentially contaminated. CFB Beaverlodge, a decommissioned Department of National Defence facility in the Cutbank Lake basin, was identified as one such site. Following the decommissioning of CFB Beaverlodge an extensive effort was undertaken to remove residual contamination (Greg Smith, Alberta Environment Regional Services). Contamination was not detected following the clean-up effort. Although a related facility on Cutbank Lake was identified as being potentially contaminated, given the local physiography it is unlikely that there is any hydrologic continuity between the lake and Bear River. It is therefore questionable whether either site constitutes a source of PCB contamination to the Bear River. No spill or contaminated site in the Grande Prairie area has been specifically identified as the source of Bear River contamination. The County of Grande Prairie has identified two contaminated sites, one of which is presently being remediated. However, the extent of contamination or potential for dispersal of contaminants at either of these sites is unknown. Alberta Power also maintained a PCB storage site in the Grange Prairie area. The potential for these sites to contribute PCBs to Bear River sediments is unknown. Given the

extensive historic use of PCBs, incidental contamination at additional sites is likely, particularly within the developed urban area of Grande Prairie.

3.5 Athabasca River

Sediment PCB concentrations measured in the Athabasca River upstream of Hinton (Figure 7) are consistently higher than background levels in the Wapiti-Smoky River basin. The sum of PCB congeners upstream of Hinton ranges from 0.151 µg/kg upstream of Maskuta Creek to 0.284 µg/kg at the mouth of Brule Lake. This is approximately an order of magnitude higher than the PCB levels in the Wapiti River upstream of the Weyerhaeuser pulp mill. However, a study of sediments in three tributaries to the Athabasca and Smoky rivers, the Sakwatamau, Freeman, and Little Smoky rivers, found ΣPCB concentrations (209 congeners) of 0.258 µg/kg, 0.283 µg/kg, and 0.246 µg/kg, respectively (Gabos et al. 2001; Ikonomou 1999), similar to concentrations found in sediments of the Athabasca River upstream of Hinton. None of these rivers are subject to effluent discharge from urban or heavy industry sources, although all are within approximately 150 km of the hazardous waste treatment facility at Swan Hills, where PCB contaminated materials are incinerated. The source of this baseline contamination has not been identified. Background PCB levels in the Athabasca River mainstem are also consistent with those from Happy Creek, a tributary that is hydrologically distinct from the mainstem. The composition of PCBs in Happy Creek sediments is similar to that of other sites sampled in the upper Athabasca River (Appendix A5).

The somewhat higher background PCB levels in the Athabasca River may in part be due to physiographic differences between the Athabasca and Wapiti-Smoky basins. Because the Athabasca River upstream of Hinton is fed predominantly by glacial runoff and snowmelt, atmospheric deposition may be a more important contributor to background PCB levels through the distillation of volatilised PCB residues (e.g., Wania and Mackay 1993). As well, a potential point source of PCB contamination to the Athabasca River above Brule Lake was identified in an assessment of a trade waste pit north of Jasper (I.D. Systems Ltd. 1993). Located 11 km north of Jasper and active since early 1970, the trade waste pit contains industrial wastes from local industry and is assumed to contain PCB waste. Because of its proximity to the Athabasca River (150 m) and its presumed continuity with groundwater, the potential exists for PCB contamination of the Athabasca River by leachate from this pit. Additional localised sources of PCB contamination to the Athabasca River upstream of Hinton have not been identified.

Environment Canada conducted an extensive monitoring program of the Athabasca River below the Snaring River (downstream of the trade waste pit) from 1973 through 1991, but did not detect PCBs in water samples (Block et al. 1993). However, analytical limits of detection at the time of sampling by Environment Canada were approximately one hundred times higher than by current methods. Analysis of bottom sediments for trace organic compounds has not been conducted upstream of Brule Lake.

While they remain below the CCME ISQG for PCBs of 34.1 µg/kg, ΣPCBs in the Hardisty Creek sample (3.2 µg/kg) are significantly elevated above apparent background levels. This is a clear indication of contamination in the Hardisty Creek basin. The Wilcoxon-Mann-Whitney rank order test (p=95%) is applied to congener data, retaining values that are below the limit of

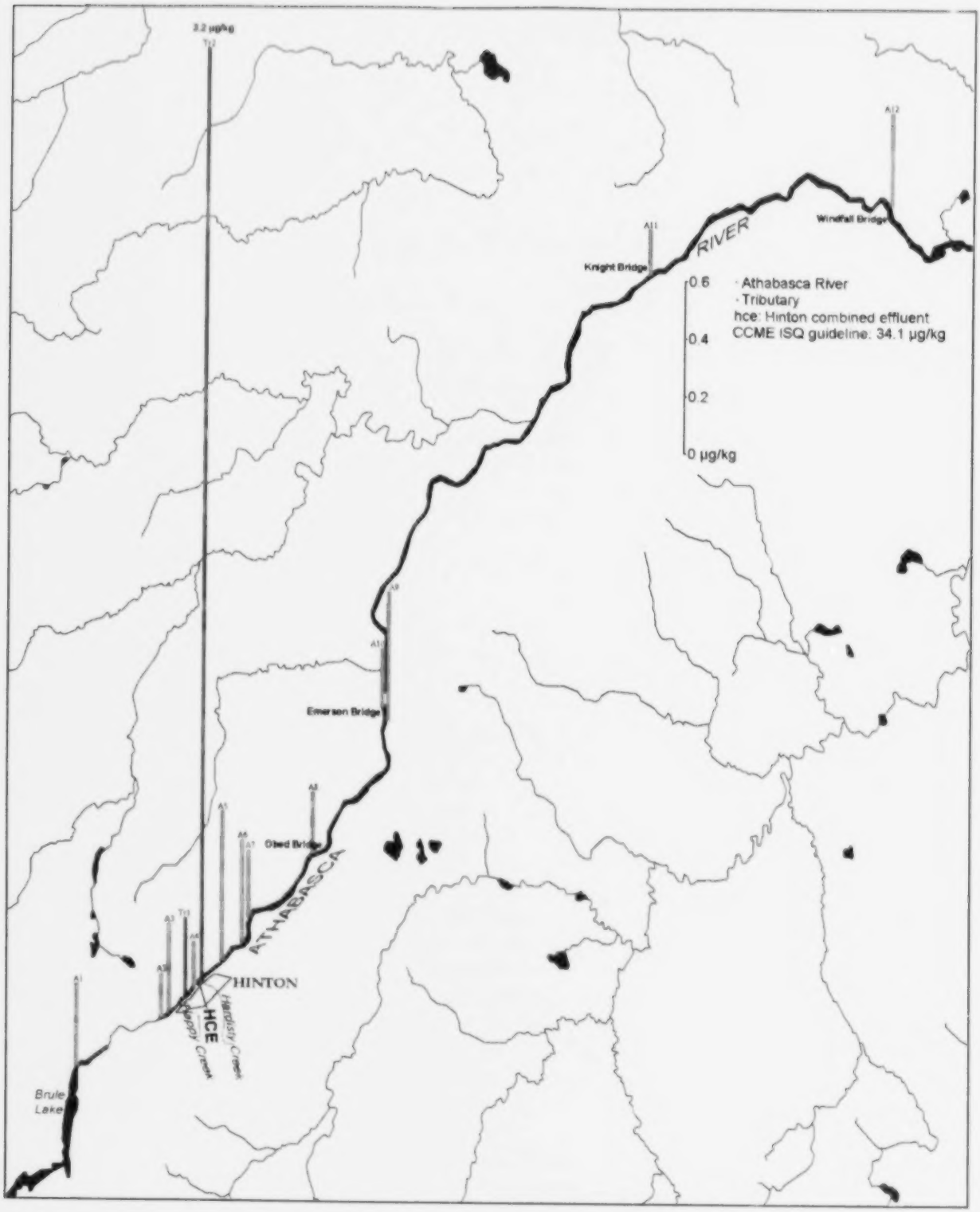

Figure 7 **Sediment ΣPCB concentrations in samples collected in 2000 from the Athabasca River**

quantification and setting all <DL values to zero. Because of the significant discrepancy between the duplicate and primary sample congener concentrations for the site directly downstream of Hardisty Creek, the arithmetic mean of the two samples is used for inter-site comparisons. By this analysis, PCB congeners in Hardisty Creek rank significantly higher than those in all other samples. The significance of the ranking of the Hardisty Creek sample against all others is a robust indicator of the divergence of this sample from mainstem samples. Contaminant sources in the Hardisty creek basin have not been identified.

Total PCBs are slightly above background levels in the Athabasca River 4 km downstream of Hardisty Creek (results of analyses on split samples: 0.872 µg/kg; 0.170 µg/kg). However, samples from further downstream do not differ significantly from upstream samples.

The slightly increased PCB concentrations downstream of Hardisty Creek are clearly derived in part from sources in the Hinton area (Figure 7). However, with the exception of the site directly downstream of Hinton, none of these samples are elevated significantly above levels in the sample collected upstream of Maskuta Creek, the least contaminated of all sites in the Athabasca River sediment study (Wilcoxon-Mann-Whitney rank order test, P=90%; one-way ANOVA using Bonferroni post-hoc comparisons test, P=90%). All sites downstream of Hinton are well below the CCME interim sediment quality guideline of 34.1 µg/kg.

Sediment PCB concentrations do not appear to decline longitudinally, such as would be expected given the propensity for PCBs to partition out of the water column. While sediment PCB levels decrease progressively to downstream of Obed, the samples from upstream of Emerson Bridge and Windfall Bridge show the opposite behaviour, with somewhat hig[illegible] concentrations. Despite the apparent persistence of PCB contamination over the length of the sample area, significant additional sources are not likely to exist between Hinton and the Windfall Bridge.

The sorption of PCBs to sediment particles may be altered by the presence of dissolved organic carbon (DOC), which can affect the mobility of PCBs in sediments (Evans 1988; Gunkel and Nolte 1994). Although PCBs typically have a very low coefficient of solubility they can be effectively solubilised by partitioning from sediment particles to DOC, thereby providing a mechanism for vertical or longitudinal transport. Given the substantial flux of carbon from the Hinton combined effluent discharge into the Athabasca River (Noton and Saffran 1995), DOC binding and mobilisation of PCBs may be an important factor affecting their vertical and longitudinal dispersion, and could account for a portion of the observed variability in sediment PCB concentrations. However, there was no appreciable correspondence between sediment PCB concentrations and total organic carbon (TOC) content (Appendix B).

Underlying patterns in the composition and abundance of PCBs are explored using PCA to extract variance in PCB concentrations among sediment samples. Apart from the Hardisty Creek sample, which dominates the analysis and defines the first PC axis, PCA did not extract any significant inter-site differences from sediment PCB congeners. A separation, based on congener signatures, of samples collected upstream and downstream of Hinton does not occur, consistent with there being no significantly elevated PCBs in sediment downstream of Hinton. This finding is in contrast to the apparent grouping of Wapiti River basin sediment PCBs, which

defines three distinct groups according to the presumed origin of the contaminants. The Wapiti-Bear sites showed significant differences in PCB concentrations between the groups.

The absence of a distinct variance structure as determined by PCA may be an indication of selective partitioning of PCB congeners according to differential solubility. Other studies have reported selective partitioning of PCB congeners that results in downstream transport of less hydrophobic species, i.e., species having fewer chlorine residues (Kulp 1991; Schneider et al. 2001; Alkhatib and Weigand 2002). As discussed, the abundance of effluent-derived DOC may also be an important factor in the partitioning and transport of PCBs. However, these factors would also be expected to operate in the Wapiti River basin, where PCA revealed a distinct separation of samples based on PCB composition and abundance. The reason for the absence of a similar gradient in Athabasca River sediment samples is therefore uncertain.

4.0 GENERAL DISCUSSION

Investigations of PCBs in filtered water and suspended solids were conducted on the Wapiti and Bear Rivers in 1999 and on the Athabasca River in 2001 (Alaee *et al.* 2003). Trace levels of PCB contamination (< 0.001 µg/L) were detected in filtered (1.2 µm glass fibre filter) water at all sites along the Wapiti River. These levels are consistent with levels from other presumably un-contaminated sites. The highest concentration of PCBs in the filtered samples occurred just below Bear River, however the filtered samples provided no clear indication of any other localised contamination.

Because PCBs are very hydrophobic, the suspended solids fraction of the Wapiti River samples are more likely to provide an indication of contaminant levels than the filtered water fraction. PCB levels in suspended solids collected at the Highway 40 bridge and downstream of the Grande Prairie WWTP are probably indicative of background levels (< 4.292 µg/kg (28 Oct. 1999)). Alaee *et* al. (2003) reported that suspended solids collected below the railroad bridge contained significantly higher levels of PCBs than those collected at the two more upstream sites (ΣPCB of 11.955 µg/kg (20 May 1999) and 29.085 µg/kg (31 Oct. 1999)). Samples collected below Bear River also contained elevated PCB levels (ΣPCB of 5.234 µg/kg (21 May 1999) and 9.705 µg/kg (1 Nov. 1999)), although they were less elevated than those collected below the railroad bridge.

The observations of Alaee *et al.* (2003) are consistent with sediment PCB concentrations detected in the present study in the Wapiti River system. In both suspended solids and bottom sediments, PCB levels are near apparent background above the pulp mill, and exceed apparent background below it. Whether this is attributable to PCB residues contained in effluent or to persistent contamination from the 1978 spill is unknown. Sampling of pulp mill effluent conducted independently by Weyerhaeuser in 1998 did not reveal elevated PCB levels. Further coordinated sampling of pulp mill effluent conducted in the same year by Weyerhaeuser and Alberta Environment was inconclusive due to laboratory blank contamination.

PCB levels in suspended solids collected at all sites in the Athabasca River (< 8.4 µg/kg; Alaee *et al.* 2003) were generally similar to apparent background levels for suspended solids in the Wapiti River. By comparison, apparent background PCB levels in bottom sediment were notably higher in the Athabasca River than in the Wapiti River. PCB levels in suspended solids collected upstream of Hinton are generally lower than in other samples. While PCB levels in suspended solids samples collected at Obed and Blue Ridge appear to be slightly higher than at Windfall, the reverse is true of PCBs in filtered water, suggesting that the apparent trend is related to partitioning of PCBs between the particulate and aqueous phases.

The Hinton combined effluent discharge, located just upstream of Hardisty Creek, combines process effluent from the Weldwood pulp mill with municipal effluent. The combined treated effluent discharge is a major point source input to the Athabasca River. However, there is no evidence to suggest that either the Hinton municipal effluent or the pulp mill effluent contain PCBs. Sampling of Hinton combined effluent conducted independently by Weldwood in 1998 revealed effluent PCB levels that were generally consistent with levels in filtered water samples collected above the pulp mill by Alaee *et al.* (2001). Further coordinated sampling of pulp mill

effluent conducted in the same year by Weldwood and Alberta Environment was inconclusive due to laboratory blank contamination. Pulp mill effluent has been shown to contain PCB residues, however these residues have typically been inferred to originate primarily from the processing of contaminated material (Macdonald et al. 1998). While effluent from bleached kraft pulp mills can contain an extensive suite of organochlorine residues that are generated in the bleaching process, including chlorinated phenolics, there is so far no conclusive evidence to indicate that the process favours the generation of PCBs (Merriman 1988; Rantio 1996). The use of chlorine dioxide (ClO_2) as a bleaching agent may further reduce the potential for production of PCBs (Macdonald et al. 1998).

Although the kraft bleaching process used in pulp mills results in the generation of many species of chlorinated organic compounds, evidence for the generation of PCBs is lacking. The use of chlorine dioxide (ClO2) in the bleaching process significantly reduces the production of chlorinated organic compounds and by extension, of PCBs. While a significant reduction of chlorinated dioxins and furans in fish tissue was observed following the transition to chlorine dioxide bleaching at Weyerhaeuser and Weldwood in the early 1990s, a similar reduction in fish tissue PCB levels was not observed (Muir and Fraikin 2003). This suggests the existence of additional PCB sources, consistent with the findings of this report.

Partitioning of organic contaminants to the silt-clay fraction ($\varnothing < 0.053$ mm) of sediment samples has been noted in previous studies (e.g., Razak et al. 1996), presumably as a function of the absorptive area to volume ratio of sediment particles. However, separate analyses of the silt-clay and sand ($2.00 \text{ mm} > \varnothing > 0.053$ mm) fraction for organic acids and halogenated organic compounds during the NRBS did not reveal consistent patterns of partitioning based on particle size (Crosley 1996). Similarly, no consistent pattern emerged from inter-sample comparison of TOC or particle size data in the present study. Principal components analysis of sediment particle size, TOC content (Appendix B), and congener or ΣPCB (Appendix A) data from the Athabasca, Wapiti, and Bear rivers did not extract any consistent variance patterns, indicating that while the physical properties of sediment may influence the partitioning of PCBs, other factors predominate.

There is also little evidence for TOC or particle size dependant partitioning of PCBs at a local scale (Appendix B). The duplicate samples collected below the Hinton combined effluent discharge (site 1) have a large discrepancy in PCB content, with a nearly identical particle composition. TOC content differs between the two samples, however the samples do not show the expected positive relationship of PCBs to TOC content. Samples collected in 1997 between the Weyerhaeuser cooling water out-fall and the final effluent discharge do show a positive relationship between PCBs and TOC content, although this may be incidental as the apparent pattern is not consistent when subsequent sites are considered. As well, the particle size distribution of the sample from site 2 having a lower PCB concentration is towards small particles, while that from site 1, which has the greater PCB concentration, is towards larger particles. In the Bear River greater PCB levels occur in and downstream of the impoundment. However, because fine particles are retained within the reservoir the particle size distribution downstream of the reservoir is changed, likely masking any particle size relationships that may exist in the basin. Location along the river through Grande Prairie appears to be a more important determinant of PCB concentrations.

5.0 CONCLUSIONS

- Sediment sampling and detailed, low-level PCB analyses were conducted on the study rivers. The work achieved very low detection limits, negligible blank contamination, and generally good precision among split samples within the analytical laboratory.

- PCB levels in the study rivers were generally low, and consistent with findings from other investigations in Alberta. All PCB levels in sediments were below the CCME interim guideline for PCBs in sediments of 34.1 µg/kg.

- The Wapiti River had somewhat elevated PCB concentrations downstream of the pulp mill, and downstream of the Bear River inflow, consistent with the pattern of PCB contamination in fish. The pulp mill location appears to be a source, which could be related to residual PCBs from the spill in 1978.

- The Bear River appeared to be subject to localised PCB loading, potentially from historic and/or persistent sources. Sediment PCB levels in the impoundment on the river in Grande Prairie, and at sites downstream of there, were above apparent background levels, although still within guidelines

- PCB concentrations in sediments of the Peace River near the Smoky River confluence were low and similar to concentrations in the lower Smoky River. This contrasts with the apparently high concentrations reported earlier by NRBS for that location on the Peace River.

- PCBs in sediments in the Athabasca River upstream of Hinton were somewhat higher than in the upper Wapiti-Smoky rivers. PCB levels downstream of Hinton were slightly elevated over levels observed at upstream sites, but not consistently so.

- Hardisty Creek, a tributary to the Athabasca River in Hinton, appears subject to higher PCB inputs. The sediment PCB concentration at the mouth of Hardisty Creek was well in excess of that at other sites in the study area, although still below the CCME guideline.

- Although associations between PCB concentration, sediment particle size, and organic carbon content have been identified in other studies, no clear associations were found in the present study. This is consistent with studies of organic compounds in sediments conducted in the course of the NRBS. Spatial factors (i.e., location) appeared to be more important in determining sediment PCB concentrations.

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Appendix A1 Peace River and lower Smoky River 1997 samples: sediment PCB data

		Blank		Smoky River	
Sample Description:		Procedural Blank		Smoky River, u/s Mouth (site 1)	
Sample Date:		6-Oct-97		6-Oct-97	
Latitude/Longitude:				56°08'49" 117°22'05"	
Lab No.:		WG2621-101 i		L1575-1R Li	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.
2,4' - DiCB/2,3 - DiCB	8/5		U		U
4,4' - DiCB	15		U		U
2,2',6 - TriCB	19		U		U
2,2',5 - TriCB	**18**		**U**		**0.002**
2,2',4 - TriCB	**17**		**U**		**U**
2,3,6 - TriCB/2,3',6 - TriCB	**24/27**		**U**		**U**
2,2',3 - TriCB/2,4',6 - TriCB	16/32		U	R	0.001
2,3',5 - TriCB	26		U		U
2,3',4 - TriCB	25		U		U
2,4',5 - TriCB	**31**		**0.001**	**R**	**0.001**
2,4,4' - TriCB	**28**		**0.001**		**0.001**
2',3,4 - TriCB/2,3,3' - TriCB/2,3,4' - TriCB	**33/20/21**		**U**	**R**	**0.001**
2,3,4' - TriCB	22		U	R	0.001
2,2',3,6 - TeCB	45		U		U
2,2',3,6' - TeCB	46		U		U
2,2',5,5' - TeCB/2,3',5',6 - TeCB	**52/73**		**U**		**0.002**
2,2',4,5' - TeCB/2,2',3,5 - TeCB	**49/43**		**U**	**R**	**0.001**
2,2',4,4' - TeCB/2,2',4,5 - TeCB/2,4,4',6 - TeCB	**47/48/75**		**U**	**R**	**0.001**
2,2',3,5' - TeCB	44		U	R	0.001
2,2',3,4' - TeCB/2,3,3',6 - TeCB	42/59		U		U
2,2',3,4-TeCB/2,3',4',6-TeCB/2,3,4',6-TeCB/2,3',4,5'-TeCB	41/71/64/68		U		U
2,2',3,3' - TeCB	**40**		**U**		**U**
2,4,4',5 - TeCB/2,3,4,5 - TeCB	**74/61**		**U**		**U**
2,3',4',5 - TeCB/2',3,4,5 - TeCB	**70/76**	**R**	**0.001**	**R**	**0.001**
3,3',4,4' - TeCB	77		0.0002		0.0003
2,3',4,4' - TeCB/3,3',5,5' - TeCB	66/80		0.001	R	0.001
2,3,3',4' - TeCB/2,3,4,4' - TeCB	56/60		U		U
2,2',3,5',6 - PeCB/2,2',3,5,6 - PeCB	**95/93**		**U**		**0.001**
2,2',3,4',6 - PeCB	**91**		**U**		**U**
2,2',3,5,5' - PeCB	**92**		**U**		**U**
2,2',3,3',6 - PeCB	84		U	R	0.001
2,2',3,4',5 - PeCB/2,2',4,5,5' - PeCB/2,2',3,4,6' - PeCB	90/101/89		U		0.002
2,2',4,4',5 - PeCB	99		U		U
2,2',3,3',5 - PeCB/2,3,3',4,5' - PeCB	**83/108**		**U**		**U**
2,2',3',4,5 - PeCB/2,2',3,4,5 - PeCB	**97/86**		**U**		**U**
2,2',3,4,5' - PeCB/2,3,4,4',6 - PeCB/2,3,4,5,6 - PeCB	**87/115/116**		**U**		**U**
2,2',3,4,4' - PeCB/2,3',4,5,5' - PeCB	85/120		U		U
2,3,3',4',5 - PeCB	110		U		0.001
2,3,3',4',5 - PeCB/2,3,3',4,6 - PeCB	107/109		U		U
2,3,3',4,5 - PeCB/2,3',4,4',5 - PeCB	**108/118**		**0.001**	**R**	**0.002**
2,3,4,4',5 - PeCB	**114**		**U**		**U**
2,3,3',4,4' - PeCB/3,3',4,5,5' - PeCB	**105/127**	**R**	**0.001**		**U**
3,3',4,4',5 - PeCB	126		U		U
2,2',3,3',6,6' - HxCB	136		U	R	0.001
2,2',3,5,5',6 - HxCB	151		U		U
2,2',3,4,5',6 - HxCB/2,2',3,3',5,6' - HxCB	**144/135**		**U**		**U**
2,2',3,4',5',6 - HxCB/2,2',3,4,4',6 - HxCB	**149/139**		**U**		**0.001**
2,2',3,3',5,6 - HxCB/2,2',3,4,5,6' - HxCB	**134/143**		**U**		**U**
2,2',3,3',4,6 - HxCB/2,2',3,4,5,6 - HxCB	131/142		U		U
2,2',3,4',5,5' - HxCB	146		U		U
2,2',4,4',5,5' - HxCB	153		U	R	0.002

		Blank		Smoky River	
Sample Description:		Procedural Blank		Smoky River, u/s Mouth (site 1)	
Sample Date:		6-Oct-97		6-Oct-97	
Latitude/Longitude:				56°08'49" 117°22'05"	
Lab No.:					
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.
2,2',3,4,5,5' - HxCB	141		U		U
2,2',3,3',4,5' - HxCB	130		U		U
2,2',3,4,4',5 - HxCB	137		U		U
2,2',3,4,4',5'-HxCB/2,3,3',4',5,6-HxCB/2,3,3',4',5',6-HxCB	138/163/164	R	0.002		0.003
2,3,3',4,4',6 - HxCB/2,3,3',4,5,6 - HxCB	158/160		U	R	0.001
2,2',3,3',4,5 - HxCB	129		U		U
2,2',3,3',4,4' - HxCB	128		U		U
2,3,3',4,4',5 - HxCB	156		U		U
2,3,3',4,4',5' - HxCB	157		U		U
3,3',4,4',5,5' - HxCB	169	R	0.0002	R	0.0002
2,2',3,3',5,6,6' - HpCB	179		U		U
2,2',3,3',4,6,6' - HpCB	176		U		U
2,2',3,3',5,5',6 - HpCB	178		U		U
2,2',3,3',4,5',6 - HpCB	175		U		U
2,2',3,4',5,5',6 - HpCB/2,2',3,4,4',5,6' - HpCB	187/182		U		U
2,2',3,4,4',5',6 - HpCB	183		U		U
2,2',3,4,5,5',6 - HpCB	185		U		U
2,2',3,3',4,5,6' - HpCB/2,2',3,4,4',5,6 - HpCB	174/181		U		U
2,2',3,3',4',5,6 - HpCB	177		U		U
2,2',3,3',4,4',6 - HpCB	171		U		U
2,2',3,3',4,5,5' - HpCB/2,3,3',4,5',5',6 - HpCB	172/192		U		U
2,2',3,4,4',5,5' - HpCB	180		U	R	0.001
2,3,3',4',5,5',6 - HpCB	193		U		U
2,3,3',4,4',5',6 - HpCB	191		U		U
2,2',3,3',4,4',5 - HpCB/2,3,3',4,4',5,6 - HpCB	170/190		U		U
2,3,3',4,4',5,5' - HpCB	189		U		U
2,2',3,3',4,5',6,6' - OcCB	201		U		U
2,2',3,3',4,4',6,6' - OcCB	197		U		U
2,2',3,3',4,5,5',6 - OcCB	198		U		U
2,2',3,3',4,5,5',6' - OcCB	199		U		U
2,2',3,3',4,4',5,6' - OcCB/2,2',3,4,4',5,5',6 - OcCB	196/203		U		U
2,2',3,3',4,4',5,6 - OcCB	195		U		U
2,2',3,3',4,4',5,5' - OcCB	194		U		U
2,3,3',4,4',5,5',6 - OcCB	205		U		U
2,2',3,3',4,5,5',6,6' - NoCB	208		U		U
2,2',3,3',4,4',5,6,6' - NoCB	207		U		U
2,2',3,3',4,4',5,5',6 - NoCB	206		U		U
2,2',3,3',4,4',5,5',6,6' - DeCB	209		U		U
	ΣPCBs[1]		0.0042		0.0133

[1]Excludes R flagged values

[2]Concentration as ng/g dry wt.

Flag: R = Peak detected but not confirmed by ratio; U = Not Detected

Analysis by Axys Analytical Services Ltd.

	Smoky River				Peace River					
	Smoky River, u/s Mouth (site 2) 6-Oct-97 56°09'36" 117°21'05" L1575-2R i (A)		Smoky River, u/s Mouth (site 2 - duplicate) 6-Oct-97 56°09'36" 117°21'05" WG2621-106 i		Peace River, u/s Smoky River (site 2) 6-Oct-97 56°10'14" 117°23'14" L1575-3Ri		Peace River ,u/s Smoky River (site 3) 6-Oct-97 56°09'46" 117°23'37" L1575-4R i		Peace River, u/s Smoky River (site 3 - duplicate) 6-Oct-97 56°09'46" 117°23'37" L1575-4B Li	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
8/5		U		U		U		U		
15		U		U		U		U		
19		U		U		U		U		
18	R	**0.002**		**0.002**	R	**0.001**		**U**		
17		**U**		**U**		**U**		**U**		
24/27		**U**		**U**		**U**		**U**		
16/32		U	R	0.001		U		U		
26		U		U		U		U		
25		U		U		U		U		
31		**U**	R	**0.001**	R	**0.001**		**0.001**		
28		**U**	R	**0.001**	R	**0.001**	R	**0.001**		
33/20/21		**U**	R	**0.001**	R	**0.001**	R	**0.001**		
22		U	R	0.001		U		0.001		
45		U		U		U		U		
46		U		U		U		U		
52/73		**0.003**	R	**0.002**		**0.001**		**0.001**		
49/43		**U**	R	**0.001**	R	**0.001**		**0.001**		
47/48/75		**0.002**	R	**0.002**		**0.001**		**0.001**		
44		U	R	0.001		U	R	0.001		
42/59		U		U		U	R	0.001		
41/71/64/68	R	0.001		0.001		U		0.001		
40		**U**		**U**		**U**		**U**		
74/61	R	**0.001**		**U**		**U**		**U**		
70/76	R	**0.001**	R	**0.002**		**0.001**		**0.001**		
77		0.0002		n/a		0.0002		0.0003		0.0002
66/80	R	0.001		0.001	R	0.001		0.001		
56/60		U	R	0.001		U		U		
95/93		**U**		**0.001**	R	**0.002**		**0.001**		
91		**U**		**U**		**U**		**U**		
92		**U**		**U**		**U**		**U**		
84		U		U		U		U		
90/101/89	R	0.002	R	0.002	R	0.003	R	0.002		
99		U	R	0.001		U		0.001		
83/108		**U**		**U**		**U**		**U**		
97/86		**U**	R	**0.001**		**U**		**U**		
87/115/116		**U**	R	**0.001**		**U**	R	**0.001**		
85/120		U		U		U		U		
110	R	0.003		0.002	R	0.002	R	0.002		
107/109		U		U		U		U		
108/118	R	**0.002**	R	**0.002**	R	**0.002**		**0.002**		
114		**U**		**U**		**U**		**U**		
105/127		**U**		**U**		**U**		**U**		
126		U		n/a		U		U		U
136		U	R	0.001		U		U		
151		U		U		0.001		U		
144/135		**U**		**U**		**U**		**U**		
148/139		**U**		**0.002**		**0.002**		**0.002**		
134/143		**U**		**U**		**U**		**U**		
131/142		U		U		U		U		
146		U		U		U		U		
153	R	0.003		0.002	R	0.003	R	0.001		

	Smoky River				Peace River					
	Smoky River, u/s Mouth (site 2) 6-Oct-97 56°09'36" 117°21'05"		Smoky River, u/s Mouth (site 2 - duplicate) 6-Oct-97 56°09'36" 117°21'05"		Peace River, u/s Smoky River (site 2) 6-Oct-97 56°10'14" 117°23'14"		Peace River ,u/s Smoky River (site 3) 6-Oct-97 56°09'46" 117°23'37"		Peace River, u/s Smoky River (site 3 - duplicate) 6-Oct-97 56°09'46" 117°23'37"	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
141		U		U	R	0.001		U		
130		U		U		U		U		
137		U		U		U		U		
138/163/164	R	0.003	R	0.002		0.004		0.002		
158/160		U		0.001		U		U		
129		U		U		U		U		
128		U		U		U		U		
156		U		U		U		U		
157		U		U		U		U		
169	R	0.0003		n/a	R	0.0002		U	R	0.0002
179		U		U		U		U		
176		U		U		U		U		
178		U		U		U		U		
175		U		U		U		U		
187/182		U		U	R	0.001		U		
183		U		U	R	0.001		U		
185		U		U		U		U		
174/181		U		U	R	0.002		U		
177		U		U		U		U		
171		U		U		U		U		
172/192		U		U		U		U		
180		U		U		0.003		U		
193		U		U	R	0.001		U		
191		U		U		U		U		
170/190		U		U		0.002		U		
189		U		U		U		U		
201		U		U		U		U		
197		U		U		U		U		
198		U		U		U		U		
199		U		U		U	R	0.001		
196/203		U		U		U		U		
195		U		U		U		U		
194		U		U		U		U		
205		U		U		U		U		
208		U		U		U		U		
207		U		U		U		U		
206		U		U		U		U		
209	R	0.001		U		U		U		
ΣPCBs[1]		0.0052		0.012		0.0152		0.0163		0.0002

Appendix A2 Wapiti-Smoky-Bear river 1997 samples: sediment PCB data

		Wapiti River			
Sample Description:		Wapiti River, u/s Highway 40 (site 1)		Wapiti River, u/s Highway 40 (site 2)	
Sample Date:		30-Sep-97		30-Sep-97	
Latitude/Longitude:		55°00'30" 119°21'53"		55°02'40" 119°06'02"	
Lab No.:		9742-01		9742-02	
ANALYTE	IUPAC No.	FLAG	CONC.[2]	FLAG	CONC.
2,4' - DiCB/2,3 - DiCB	8/5		U		U
4,4' - DiCB	15		U		U
2,2',6 - TriCB	19		U		U
2,2',5 - TriCB	**18**		**U**		**U**
2,2',4 - TriCB	**17**		**U**		**U**
2,3,6 - TriCB/2,3',6 - TriCB	**24/27**		**U**		**U**
2,2',3 - TriCB/2,4',6 - TriCB	16/32		U		U
2,3',5 - TriCB	26		U		U
2,3',4 - TriCB	25		U		U
2,4',5 - TriCB/2,4,4' - TriCB	**31/28**		**U**		**U**
2',3,4 - TriCB	**33**		**U**		**U**
2,3,4' - TriCB	**22**		**U**		**U**
2,2',3,6 - TeCB	45		U		U
2,2',3,6' - TeCB	46		U		U
2,2',5,5' - TeCB	52		U		U
2,2',4,5' - TeCB	**49**		**U**		**U**
2,2',4,4' - TeCB/2,2',4,5 - TeCB	**47/48**		**U**		**U**
2,2',3,5' - TeCB	**44**		**U**		**U**
2,2',3,4' - TeCB	42		U		U
2,2',3,4 - TeCB/2,3',4',6 - TeCB/2,3,4',6 - TeCB	41/71/64		U		U
2,2',3,3' - TeCB	40		U		U
2,4,4',5 - TeCB	**74**		**U**		**0.002**
2,3',4',5 - TeCB/2',3,4,5 - TeCB	**70/76**		**0.001**		**0.003**
2,3',4,4' - TeCB	**66**		**U**		**0.002**
2,3,3',4' - TeCB/2,3,4,4' - TeCB	56/60		U		0.002
3,3',4,4' - TeCB	77		U		0.00095
2,2',3,5',6 - PeCB	95		0.001		0.001
2,2',3,4',6 - PeCB	**91**		**U**		**U**
2,2',3,3',6 - PeCB/2,2',3,5,5' - PeCB	**84/92**		**U**		**U**
2,2',3,4,6'-PeCB/2,2',3,4',5-PeCB/2,2',4,5,5'-PeCB	**89/90/101**		**0.001**		**0.001**
2,2',4,4',5 - PeCB	99		U		U
2,2',3,3',5 - PeCB	83		U		U
2,2',3',4,5 - PeCB	97		U		U
2,2',3,4,5' - PeCB	**87**		**U**		**U**
2,2',3,4,4' - PeCB	**85**		**U**		**U**
2,3,3',4',6 - PeCB	**110**		**0.002**		**0.003**
2,3,3',4',5 - PeCB	107		U		U
2,3',4,4',5 - PeCB	118	R	0.001		0.002
2,3,4,4',5 - PeCB	114		U		U
2,3,3',4,4' - PeCB	**105**	R	**0.001**	R	**0.002**
3,3',4,4',5 - PeCB	**126**		**U**		**U**
2,2',3,3',6,6' - HxCB	**136**		**U**		**U**
2,2',3,5,5',6 - HxCB	151		U		U
2,2',3,4,5',6 - HxCB/2,2',3,3',5,6' - HxCB	144/135		U		U
2,2',3,4',5',6 - HxCB	149		0.002		0.002
2,2',3,3',5,6 - HxCB	**134**		**U**		**U**
2,2',3,3',4,6 - HxCB	**131**		**U**		**U**
2,2',3,4',5,5' - HxCB	**146**		**U**		**U**

		Wapiti River			
Sample Description:		Wapiti River, u/s Highway 40 (site 1)		Wapiti River, u/s Highway 40 (site 2)	
Sample Date:		30-Sep-97		30-Sep-97	
Latitude/Longitude:		55°00'30" 119°21'53"		55°02'40" 119°06'02"	
Lab No.:		9742-01		9742-02	
Analyte	IUPAC No.	FLAG	CONC.[2]	FLAG	CONC.
2,2',4,4',5,5' - HxCB	153		0.002		0.002
2,2',3,4,5,5' - HxCB	141		U		U
2,2',3,3',4,5' - HxCB	130		U		U
2,2',3,4,4',5 - HxCB	**137**		**U**		**U**
2,2',3,4,4',5'-HxCB/2,3,3',4',5,6-HxCB/2,3,3',4',5',6-HxCB	**138/163/164**		**0.003**		**0.003**
2,3,3',4,4',6 - HxCB	**158**		**U**		**U**
2,2',3,3',4,5 - HxCB	129		U		U
2,2',3,3',4,4' - HxCB	128		U		U
2,3,3',4,4',5 - HxCB	156		U		U
2,3,3',4,4',5' - HxCB	**157**		**U**		**U**
3,3',4,4',5,5' - HxCB	**169**		**U**		**U**
2,2',3,3',5,6,6' - HpCB	**179**		**U**		**U**
2,2',3,3',4,6,6' - HpCB	176		U		U
2,2',3,3',5,5',6 - HpCB	178		U		U
2,2',3,3',4,5',6 - HpCB	175		U		U
2,2',3,4',5,5',6 - HpCB/2,2',3,4,4',5,6' - HpCB	**187/182**		**U**		**U**
2,2',3,4,4',5',6 - HpCB	**183**		**U**		**U**
2,2',3,4,5,5',6 - HpCB	**185**		**U**		**U**
2,2',3,3',4,5,6' - HpCB	174		U		U
2,2',3,3',4',5,6 - HpCB	177		U		U
2,2',3,3',4,4',6 - HpCB	171		U		U
2,2',3,3',4,5,5' - HpCB	**172**		**U**		**U**
2,2',3,4,4',5,5' - HpCB	**180**		**0.001**		**U**
2,3,3',4',5,5',6 - HpCB	**193**		**U**		**U**
2,3,3',4,4',5',6 - HpCB	191		U		U
2,2',3,3',4,4',5 - HpCB/2,3,3',4,4',5,6 - HpCB	170/190		U		U
2,3,3',4,4',5,5' - HpCB	189		U		U
2,2',3,3',4,5',6,6' - OcCB	**201**		**U**		**U**
2,2',3,3',4,4',6,6' - OcCB	**197**		**U**		**U**
2,2',3,3',4,5,5',6 - OcCB	**198**		**U**		**U**
2,2',3,3',4,5,5',6' - OcCB	199		U		U
2,2',3,3',4,4',5,6' - OcCB/2,2',3,4,4',5,5',6 - OcCB	196/203		U	R	0.005
2,2',3,3',4,4',5,6 - OcCB	195		U		U
2,2',3,3',4,4',5,5' - OcCB	**194**		**U**		**U**
2,3,3',4,4',5,5',6 - OcCB	**205**		**U**		**U**
2,2',3,3',4,5,5',6,6' - NoCB	**208**		**U**		**U**
2,2',3,3',4,4',5,6,6' - NoCB	207		U		U
2,2',3,3',4,4',5,5',6 - NoCB	206		U		U
2,2',3,3',4,4',5,5',6,6' - DeCB	209		U		U
	ΣPCBs[1]		**0.013**		**0.02395**
Aroclor 1242			U		U
Aroclor 1254			U		U
Aroclor 1260			U		U

[1]Excludes R flagged values

[2]Concentration as ng/g dry wt.

Flag: R = Peak detected but not confirmed by ratio; U = Not Detected

Analysis by Axys Analytical Services Ltd., Jan-Mar 1998

	Wapiti River									
	Wapiti River, u/s Highway 40 (site 2 - duplicate)		Wapiti River, u/s Highway 40 (site 3)		Wapiti River, Weyerhaeuser FE to RR br. (site 2)		Wapiti River, Weyerhaeuser FE to RR br. (site 3)		Wapiti River, RR br. to Bear River (site 2)	
	30-Sep-97		30-Sep-97		30-Sep-97		30-Sep-97		30-Sep-97	
	55°02'40" 119°06'02"		55°04'08" 118°48'52"		55°03'46" 118°38'38"		55°04'19" 118°37'58"		55°04'21" 118°34'03"	
	9742-02B		9742-03		9742-04		9724-05		9742-06	
IUPAC No.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
8/5		U		U	R	0.004		U		U
15		U		U		U		U		U
19		U		U		U		U		U
18		**U**		**U**		**U**		**U**		**U**
17		**U**		**U**		**U**		**U**		**U**
24/27		**U**		**U**		**U**		**U**		**U**
16/32		U		U		U		U		U
26		U		U		U		U		U
25		U		U		U		U		U
31/28		**U**		**U**		**0.01**		**U**		**U**
33		**U**		**U**		**U**		**U**		**U**
22		**U**		**U**		**U**		**U**		**U**
45		U		U		U		U		U
46		U		U		U		U		U
52		U		U	R	0.02		U		U
48		**U**		**U**		**0.008**		**U**		**U**
47/48		**U**		**U**	**R**	**0.009**		**U**		**U**
44		**U**		**U**		**U**		**U**		**U**
42		U		U		U		U		U
41/71/64		U		U	R	0.01		U		U
40		U		U		U		U		U
74		**U**		**U**		**U**		**U**		**U**
70/76		**U**		**U**		**0.01**		**U**		**U**
66		**U**		**U**		**0.006**		**U**		**U**
56/60		U		U		U		U		U
77		0.00086		U		0.00140		U		U
95	R	0.001		U		0.006		0.003		0.001
91		**U**		**U**		**U**		**U**		**U**
84/92		**U**		**U**		**U**		**U**		**U**
89/90/101		**U**	R	**0.001**		**0.009**		**0.004**		**0.003**
99		U		U		0.005		U		0.001
83		U		U		U		U		U
97		U		U		U		U		U
87		**U**		**U**		**0.006**		**U**		**U**
85		**U**		**U**		**U**		**U**		**U**
110		**0.001**		**U**		**0.02**		**0.006**		**0.005**
107		U		U		U		U		U
118		U		U		0.009		0.003		0.002
114		U		U		U		U		U
105		**U**		**U**		**U**		**U**		**U**
126		**U**		**U**		**U**		**U**		**U**
136		**U**		**U**		**U**		**U**		**U**
151		U		U		U		U		U
144/135		U		U		U		U		U
149		U		U		0.005		U		U
134		**U**		**U**		**U**		**U**		**U**
131		**U**		**U**		**U**		**U**		**U**
146		**U**		**U**		**U**		**U**		**U**

	Wapiti River									
	Wapiti River, u/s Highway 40 (site 2 - duplicate) 30-Sep-97 55°02'40" 119°06'02" 9742-02B		Wapiti River, u/s Highway 40 (site 3) 30-Sep-97 55°04'08" 118°48'52" 9742-03		Wapiti River, Weyerhaeuser FE to RR br. (site 2) 30-Sep-97 55°03'46" 118°38'38" 9742-04		Wapiti River, Weyerhaeuser FE to RR br. (site 3) 30-Sep-97 55°04'19" 118°37'58" 9724-05		Wapiti River, RR br. to Bear River (site 2) 30-Jun-97 55°04'21" 118°34'03" 9742-06	
IUPAC No.	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**
153		U		U		0.008		U		0.003
141		U		U		U		U		U
130		U		U		U		U		U
137		**U**		**U**		**U**		**U**		**U**
138/163/164		**U**		**U**		**0.01**		**U**		**0.004**
158		**U**		**U**		**U**		**U**		**U**
129		U		U		U		U		U
128		U		U		U		U		U
156		U		U		U		U		U
157		**U**		**U**		**U**		**U**		**U**
169		**U**		**U**	**R**	**0.00022**		**U**		**U**
179		**U**		**U**		**U**		**U**		**U**
176		U		U		U		U		U
178		U		U		U		U		U
175		U		U		U		U		U
187/182		**U**		**U**		**U**		**U**		**U**
183		**U**		**U**		**U**		**U**		**U**
185		**U**		**U**		**U**		**U**		**U**
174		U		U		U		U		U
177		U		U		U		U		U
171		U		U		U		U		U
172		**U**		**U**		**U**		**U**		**U**
180		**U**		**U**	**R**	**0.004**		**U**		**U**
193		**U**		**U**		**U**		**U**		**U**
191		U		U		U		U		U
170/190		U		U		U		U		U
189		U		U		U		U		U
201		**U**		**U**		**U**		**U**		**U**
197		**U**		**U**		**U**		**U**		**U**
198		**U**		**U**		**U**		**U**		**U**
199		U		U		U		U		U
196/203	R	0.005	R	0.006	R	0.01		U	R	0.007
195		U		U		U		U		U
194		**U**		**U**		**U**		**U**		**U**
205		**U**		**U**		**U**		**U**		**U**
208		**U**		**U**		**U**		**U**		**U**
207		U		U		U		U		U
206		U		U		U		U		U
209		U		U		U		U		U
ΣPCBs[1]		**0.00186**		**0**		**0.1134**		**0.016**		**0.019**
Aroclor 1242		U		U		U		U		U
Aroclor 1254		U		U		U		U		U
Aroclor 1260		U		U		U		U		U

	Wapiti River						Bear River		Smoky River	
	Wapiti River, RR br. to Bear River (site 3) 30-Sep-97 55°05'25" 118°31'35" 9742-07		Wapiti River, Bear River to Smoky River (site 2) 8-Oct-97 55°07'20" 118°24'57" 9742-09		Wapiti River, Bear River to Smoky River (site 3) 8-Oct-97 55°07'21" 118°22'40" 9742-10		Bear River u/s Wapiti River 30-Sep-97 55°06'28" 118°28'19" 9742-08		Smoky River u/s Wapiti River, site 1 8-Oct-97 55°07'32" 118°17'06" 9742-11	
IUPAC No.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
8/5		U		U		U		U		U
15		U		U		U		U		U
19		U		U		U		U		U
18		U		U		U		U		U
17		U		U		U		U		U
24/27		U		U		U		U		U
16/32		U		U		U		U		U
26		U		U		U		U		U
25		U		U		U		U		U
31/28		U		U	R	0.002		0.006		0.002
33		U		U		U		U		U
22		U		U		U		U		U
45		U		U		U		U		U
46		U		U		U		U		U
52		U		U		U		U		U
49		U		U		U		U		U
47/48		U		U		U		U		U
44		U		U		U		U		U
42		U		U		U		U		U
41/71/64		U		U		U		U		U
40		U		U		U		U		U
74	R	0.002		U		U		0.002		U
70/76		0.003		0.003		0.004		0.005		0.002
66		0.001	R	0.001		U		0.002		0.001
56/60		U		U		U		0.001		U
77		0.00170		0.00043		U		0.00060		U
95		0.003		0.003		0.004		0.006		U
91		U		U		U		U		U
84/92	R	0.002		U		U	R	0.004		U
89/90/101		0.005	R	0.004		0.005		0.008		U
99		0.002		U		0.003	R	0.003		U
83		U		U		U		U		U
97		0.001		U		U		0.003		U
87		0.003		U		0.004		0.005		U
85		0.001		U		U		0.002		U
110		0.008	R	0.007		0.01		0.02	R	0.002
107		U		U		U		U		U
118		0.003		0.003		0.005		0.006		0.001
114		U		U		U		U		U
105	R	0.002		U		0.002		0.003		U
126		U		U		U		U		U
136		U		U		U		U		U
151		U		U		U		U		U
144/135		U		U		U		U		U
149	R	0.003		U		0.005		0.01		U
134		U		U		U		U		U
131		U		U		U		U		U
146		U		U		U		U		U

	Wapiti River						Bear River		Smoky River	
	Wapiti River, RR br. to Bear River (site 3)		Wapiti River, Bear River to Smoky River (site 2)		Wapiti River, Bear River to Smoky River (site 3)		Bear River u/s Wapiti River		Smoky River u/s Wapiti River, site 1	
	30-Jun-97		8-Oct-97		8-Oct-97		30-Sep-97		8-Oct-97	
	55°05'25" 118°31'35"		55°07'20" 118°24'57"		55°07'21" 118°22'40"		55°06'28" 118°28'19"		55°07'32" 118°17'06"	
	9742-07		9742-09		9742-10		9742-08		9742-11	
IUPAC No.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
153		0.002		0.004		0.005		0.01		0.002
141		U		U		U		U		U
130		U		U		U		U		U
137		**U**		**U**		**U**		**U**		**U**
138/163/164		**0.003**		**0.005**		**0.007**		**0.01**	R	**0.002**
158		**U**		**U**		**U**		**U**		**U**
129		U		U		U		U		U
128		U		U		U		U		U
156		U		U		U		U		U
157		**U**		**U**		**U**		**U**		**U**
169		**U**		**U**		**U**		**U**		**U**
179		**U**		**U**		**U**		**U**		**U**
176		U		U		U		U		U
178		U		U		U		U		U
175		U		U		U		U		U
187/182		**U**		**U**		**U**		**0.004**		**U**
183		**U**		**U**		**U**	R	**0.003**		**U**
185		**U**		**U**		**U**		**U**		**U**
174		U		U		U		0.005		U
177		U		U		U		U		U
171		U		U		U		U		U
172		**U**		**U**		**U**		**U**		**U**
180		**U**		**0.002**		**U**		**0.006**		**U**
193		**U**		**U**		**U**		**U**		**U**
191		U		U		U		U		U
170/190		U		U		U		0.004		U
189		U		U		U		U		U
201		**U**		**U**		**U**		**U**		**U**
197		**U**		**U**		**U**		**U**		**U**
198		**U**		**U**		**U**		**U**		**U**
199		U		U		U		U		U
196/203		U		U		U		U		U
195		U		U		U		U		U
194		**U**		**U**		**U**		**U**		**U**
205		**U**		**U**		**U**		**U**		**U**
208		**U**		**U**		**U**		**U**		**U**
207		U		U		U		U		U
206		U		U		U		U		U
209		U		U		U		U		U
ΣPCBs[1]		**0.0367**		**0.02043**		**0.054**		**0.1186**		**0.008**
Aroclor 1242		U		U		U		U		U
Aroclor 1254		0.06		U		U	R	0.11		U
Aroclor 1260		U		U		U	R	0.08		U

	Smoky River				Blank			
	Smoky River u/s Wapiti River, site 2 8-Oct-97 55°06'46" 118°16'36" 9742-12		Smoky River u/s Wapiti River (site 2 - duplicate) 8-Oct-97 55°06'46" 118°16'36" 9742-12B		Blank 01 CL-S-BLK 1267		Blank 02 CL-S-BLK 1268	
IUPAC No.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
8/5		U		U		U		U
15		U		U		U		U
19		U		U		U		U
18		U		U		U		U
17		U		U		U		U
24/27		U		U		U		U
16/32		U		U		U		U
26		U		U		U		U
25		U		U		U		U
31/28		U		U		U		U
33		U		U		U		U
22		U		U		U		U
45		U		U		U		U
46		U		U		U		U
52		U		U		U		U
49		U		U		U		U
47/48		U		U		U		U
44		U		U		U		U
42		U		U		U		U
41/71/64		U		U		U		U
40		U		U		U		U
74		U		U		0.001		U
70/76		0.002		0.002		0.002	R	0.001
66		U		U		0.001		U
56/60		U		U	R	0.001		U
77		U		NQ		0.00068		0.00050
95		0.002		0.002		0.002		U
91		U		U		U		U
84/92		U		U		U		U
89/90/101		0.002	R	0.002		0.002		U
99		U		U		0.001		U
83		U		U		U		U
97		U		U	R	0.001		U
87		U		U		0.002		U
85		U		U		U		U
110		0.005	R	0.004		0.005		U
107		U		U		U		U
118		0.002		0.002		0.004		U
114		U		U		U		U
105		U		U		0.002		U
128		U		U		U		U
138		U		U		U		U
151		U		U		U		U
144/135		U		U		U		U
149	R	0.004		U		0.002		U
134		U		U		U		U
131		U		U		U		U
146		U		U		U		U

	Smoky River				Blank			
	Smoky River u/s Wapiti River, site 2 8-Oct-97 55°06'46" 118°16'36" 9742-12		Smoky River u/s Wapiti River (site 2 - duplicate) 8-Oct-97 55°06'46" 118°16'36" 9742-12B		Blank 01 CL-S-BLK 1267		Blank 02 CL-S-BLK 1268	
IUPAC No.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
153		0.004		0.003		0.004		U
141		U		U		U		U
130		U		U		U		U
137		**U**		**U**		**U**		**U**
138/163/164		**0.005**		**U**		**0.006**		**U**
158		**U**		**U**		**U**		**U**
129		U		U		U		U
128		U		U		U		U
156		U		U		U		U
157		**U**		**U**		**U**		**U**
169		**U**		**U**		**U**		**0.00030**
179		**U**		**U**		**U**		**U**
176		U		U		U		U
178		U		U		U		U
175		U		U		U		U
187/182		**U**		**U**		**U**		**U**
183		**U**		**U**		**U**		**U**
185		**U**		**U**		**U**		**U**
174	R	0.006		U		U		U
177		U		U		U		U
171		U		U		U		U
172		**U**		**U**		**U**		**U**
180		**U**		**U**		**0.002**		**U**
193		**U**		**U**		**U**		**U**
191		U		U		U		U
170/190		U		U		0.002		U
189		U		U		U		U
201		**U**		**U**		**U**		**U**
197		**U**		**U**		**U**		**U**
198		**U**		**U**		**U**		**U**
199		U		U		U		U
196/203		U		U		U		U
195		U		U		U		U
194		**U**		**U**		**U**		**U**
205		**U**		**U**		**U**		**U**
208		**U**		**U**		**U**		**U**
207		U		U		U		U
206		U		U		U		U
209		U		U		U		U
ΣPCBs[1]		**0.022**		**0.009**		**0.03868**		**0.0008**
Aroclor 1242		U		U		U		U
Aroclor 1254		U		U	R	0.03		U
Aroclor 1260		U		U		0.03		U

Appendix A3 Wapiti River (1997 samples) and Bear River (1998 samples): sediment PCB data

		Blank		Bear River							
Sample Descripton:		Lab Blank		Bear River (site 1)		Bear River (site 2)		Bear River (site 3)		Bear River (site 4)	
Sample Date:				06-Nov-1998		06-Nov-1998		06-Nov-1998		06-Nov-1998	
Latitude/Longitude:				55°15'04" 118°54'03"		55°13'45" 118°52'53"		55°12'02" 118°50'39"		55°07'18" 118°44'31"	
Lab No.		WG2432-1 i		L2248-1 i		L2248-2 i		L2248-3 i		L2248-4 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2 - MoCB	1	R			2.0		1.5		1.1	R	1.4
3 - MoCB	2	U		R	2.0		1.7		1.0	R	0.63
4 - MoCB	3		0.56	R	2.6	R	1.6		1.3		1.3
2,2' - DiCB	**4**	**U**		**U**		**U**		**U**		**U**	
2,3 - DiCB	**5**	**U**		**U**		**U**		**U**		**U**	
2,3' - DiCB	**6**	**U**		**U**		**U**		**R**	**3.4**	**U**	
2,4 - DiCB	7	U		U		U		U		U	
2,4' - DiCB	8	U		U		U		R	5.0		3.6
2,5 - DiCB	9	U		U		U		U		U	
2,6 - DiCB	**10**	**U**		**U**		**U**		**U**		**U**	
3,3' - DiCB	**11**	**U**		**U**		**U**		**U**			**9.3**
3,4 - DiCB	**12**	**CU**		**CU**		**CU**		**C**	**6.1**	**CU**	
3,4' - DiCB	13	C12		C12		C12		C12		C12	
3,5 - DiCB	14	U		U		U		U		U	
4,4' - DiCB	15	U		U		U			7.1		3.2
2,2',3 - TriCB	**16**	**U**		**U**		**R**	**1.9**	**U**			**2.2**
2,2',4 - TriCB	**17**	**U**		**U**		**U**		**R**	**2.3**		**2.8**
2,2',5 - TriCB	**18**	**CU**		**CR**	**1.8**	**CR**	**2.9**	**C**	**4.0**	**C**	**4.4**
2,2',6 - TriCB	19	U		U		U		U		U	
2,3,3' - TriCB	20	CR	1.5	C	4.4	C	4.1	C	12	C	11
2,3,4 - TriCB	21	CU		CR	1.7	CR	1.9	CR	2.7	C	4.9
2,3,4' - TriCB	**22**	**U**		**R**	**1.5**		**1.3**		**2.3**		**3.3**
2,3,5 - TriCB	**23**	**U**		**U**		**U**		**U**		**U**	
2,3,6 - TriCB	**24**	**U**		**U**		**U**		**U**		**U**	
2,3',4 - TriCB	25	U		U		U			2.8	R	0.72
2,3',5 - TriCB	26	CU		CU		CU		CR	4.8	C	1.6
2,3',6 - TriCB	27	U		U		U		U		U	
2,4,4' - TriCB	**28**	**C20**		**C20**		**C20**		**C20**		**C20**	
2,4,5 - TriCB	**29**	**C26**		**C26**		**C26**		**C26**		**C26**	
2,4,6 - TriCB	**30**	**C18**		**C18**		**C18**		**C18**		**C18**	
2,4',5 - TriCB	31	R	1.3	R	2.5	R	3.0		7.5		7.7
2,4',6 - TriCB	32	U		U		U			1.4		1.6
2',3,4 - TriCB	33	C21		C21		C21		C21		C21	
2',3,5 - TriCB	**34**	**U**		**U**		**U**		**U**		**U**	
3,3',4 - TriCB	**35**	**U**		**U**		**U**		**U**		**U**	
3,3',5 - TriCB	**36**	**U**		**U**		**U**		**U**		**U**	
3,4,4' - TriCB	37	U		U		U			2.8		3.1
3,4,5 - TriCB	38	U			4.6		4.1		1.8	U	
3,4',5 - TriCB	39	U		U		U		U		U	
2,2',3,3' - TeCB	**40**	**CU**		**CU**		**CU**		**C**	**6.3**	**C**	**15**
2,2',3,4 - TeCB	**41**	**C40**		**C40**		**C40**		**C40**		**C40**	
2,2',3,4' - TeCB	**42**	**U**		**U**		**R**	**0.56**	**R**	**0.98**	**R**	**2.1**
2,2',3,5 - TeCB	43	U		U		U		U		U	
2,2',3,5' - TeCB	44	C	0.68	C	3.5	C	3.1	C	4.6	C	8.6
2,2',3,6 - TeCB	45	CU		C	0.71	C	1.0	C	0.86	CR	1.7
2,2',3,6' - TeCB	**46**	**U**		**U**		**U**		**U**		**U**	
2,2',4,4' - TeCB	**47**	**C44**		**C44**		**C44**		**C44**		**C44**	
2,2',4,5 - TeCB	**48**	**U**		**R**	**0.64**	**U**		**U**		**U**	

		Blank		Bear River							
Sample Descripton:		Lab Blank		Bear River (site 1)		Bear River (site 2)		Bear River (site 3)		Bear River (site 4)	
Sample Date:				06-Nov-1998		06-Nov-1998		06-Nov-1998		06-Nov-1998	
Latitude/Longitude:				55°15'04" 118°54'03"		55°13'45" 118°52'53"		55°12'02" 118°50'39"		55°07'18" 118°44'31"	
Lab No.		WG2432-1 i		L2248-1 i		L2248-2 i		L2248-3 i		L2248-4 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',4,5' - TeCB	49	CR	0.39	CR	1.5	CR	1.7	C	3.1	C	4.7
2,2',4,6 - TeCB	50	CU		CU		CU		C	0.58	C	1.0
2,2',4,6' - TeCB	51	C45		C45		C45		C45		C45	
2,2',5,5' - TeCB	**52**	**U**			**3.6**	**R**	**3.2**	**R**	**5.3**		**12**
2,2',5,6' - TeCB	**53**	**C50**		**C50**		**C50**		**C50**		**C50**	
2,2',6,6' - TeCB	**54**	**U**		**U**		**U**		**U**		**U**	
2,3,3',4 - TeCB	55	U		U		U		U		U	
2,3,3',4' - TeCB	56	U		R	1.2	R	1.6	R	1.1		3.1
2,3,3',5 - TeCB	57	U		U		U		U		U	
2,3,3',5' - TeCB	**58**	**U**		**U**		**U**		**U**		**U**	
2,3,3',6 - TeCB	**59**	**CU**		**CU**		**C**	**1.0**	**CR**	**0.26**	**C**	**0.63**
2,3,4,4' - TeCB	**60**	**U**		**R**	**0.55**	**R**	**0.67**	**R**	**0.67**		**1.6**
2,3,4,5 - TeCB	61	CR	0.73	C	4.5	CR	3.7	C	4.0	C	14
2,3,4,6 - TeCB	62	C59		C59		C59		C59		C59	
2,3,4',5 - TeCB	63	U		U		U		U		U	
2,3,4',6 - TeCB	**64**		**0.40**	**R**	**1.3**	**R**	**1.6**		**1.7**		**4.0**
2,3,5,6 - TeCB	**65**	**C44**		**C44**		**C44**		**C44**		**C44**	
2,3',4,4' - TeCB	**66**	**R**	**0.30**		**2.2**		**2.1**		**2.7**		**5.6**
2,3',4,5 - TeCB	67	U		U		U		U		U	
2,3',4,5' - TeCB	68	U		U		U		R	0.39	U	
2,3',4,6 - TeCB	69	C49		C49		C49		C49		C49	
2,3',4',5 - TeCB	**70**	**C61**		**C61**		**C61**		**C61**		**C61**	
2,3',4',6 - TeCB	**71**	**C40**		**C40**		**C40**		**C40**		**C40**	
2,3',5,5' - TeCB	**72**	**U**		**U**		**U**		**U**		**U**	
2,3',5',6 - TeCB	73	U		U		U		U		U	
2,4,4',5 - TeCB	74	C61		C61		C61		C61		C61	
2,4,4',6 - TeCB	75	C59		C59		C59		C59		C59	
2',3,4,5 - TeCB	**76**	**C61**		**C61**		**C61**		**C61**		**C61**	
3,3',4,4' - TeCB	**77**	**U**		**R**	**0.59**		**0.79**	**R**	**0.86**		**1.4**
3,3',4,5 - TeCB	**78**	**U**		**U**		**U**		**U**		**U**	
3,3',4,5' - TeCB	79	U		U		U		U		U	
3,3',5,5' - TeCB	80	U		U		U		U		U	
3,4,4',5 - TeCB	81	U		U		U		U		U	
2,2',3,3',4 - PeCB	**82**	**R**	**0.11**	**R**	**0.56**	**R**	**0.36**	**R**	**0.41**	**R**	**2.6**
2,2',3,3',5 - PeCB	**83**	**CR**	**0.21**	**CR**	**3.0**	**CR**	**2.2**	**C**	**2.7**	**C**	**11**
2,2',3,3',6 - PeCB	**84**	**R**	**0.13**		**1.8**	**R**	**1.2**	**R**	**1.1**		**6.7**
2,2',3,4,4' - PeCB	85	CR	0.15	CR	0.93	C	1.0	C	0.75	C	3.5
2,2',3,4,5 - PeCB	86	CR	0.25	CR	4.0	CR	2.6	C	2.1	C	15
2,2',3,4,5' - PeCB	87	C86		C86		C86		C86		C86	
2,2',3,4,6 - PeCB	**88**	**CU**		**CR**	**0.89**	**CU**		**C**	**0.93**	**C**	**2.8**
2,2',3,4,6' - PeCB	**89**	**U**		**R**	**0.17**	**U**		**U**		**R**	**0.29**
2,2',3,4',5 - PeCB	**90**	**C**	**0.63**	**C**	**7.0**	**C**	**4.0**	**C**	**3.7**	**C**	**25**
2,2',3,4',6 - PeCB	91	C88		C88		C88		C88		C88	
2,2',3,5,5' - PeCB	92	R	0.10		1.4	R	0.89	R	0.5		4.2
2,2',3,5,6 - PeCB	93	CU		C	6.5	CR	4.9	C	4.7	C	23
2,2',3,5,6' - PeCB	**94**	**R**	**0.11**	**U**		**U**		**U**		**U**	
2,2',3,5',6 - PeCB	**95**	**C93**		**C93**		**C93**		**C93**		**C93**	
2,2',3,6,6' - PeCB	**96**	**U**		**U**		**U**			**0.12**		**0.14**

		Blank		Bear River							
Sample Descripton:		Lab Blank		Bear River (site 1)		Bear River (site 2)		Bear River (site 3)		Bear River (site 4)	
Sample Date:				06-Nov-1998		06-Nov-1998		06-Nov-1998		06-Nov-1998	
Latitude/Longitude:				55°15'04" 118°54'03"		55°13'45" 118°52'53"		55°12'02" 118°50'39"		55°07'18" 118°44'31"	
Lab No.		WG2432-1 i		L2248-1 i		L2248-2 i		L2248-3 i		L2248-4 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3',4,5 - PeCB	97	C86		C86		C86		C86		C86	
2,2',3',4,6 - PeCB	98	C93		C93		C93		C93		C93	
2,2',4,4',5 - PeCB	99	C83		C83		C83		C83		C83	
2,2',4,4',6 - PeCB	**100**	**C93**		**C93**		**C93**		**C93**		**C93**	
2,2',4,5,5' - PeCB	**101**	**C90**		**C90**		**C90**		**C90**		**C90**	
2,2',4,5,6' - PeCB	**102**	**C93**		**C93**		**C93**		**C93**		**C93**	
2,2',4,5',6 - PeCB	103	U		U		U		R	0.12	U	
2,2',4,6,6' - PeCB	104	U		U		U		U		U	
2,3,3',4,4' - PeCB	105	R	0.27	R	2.1		1.6		1.8	R	9.1
2,3,3',4,5 - PeCB	**106**	**U**		**U**		**U**		**U**		**U**	
2,3,3',4',5 - PeCB	**107**	**CU**		**CU**		**CU**		**CU**		**CR**	**0.89**
2,3,3',4,5' - PeCB	**108**	**C86**		**C86**		**C86**		**C86**		**C86**	
2,3,3',4,6 - PeCB	109	U		R	0.25		0.17		0.22	R	0.93
2,3,3',4',6 - PeCB	110	CR	0.47	CR	7.3	CR	4.0	C	4.3	C	32
2,3,3',5,5' - PeCB	111	U		R	0.099	U		U		U	
2,3,3',5,6 - PeCB	**112**	**U**		**U**		**U**		**U**		**U**	
2,3,3',5',6 - PeCB	**113**	**C90**		**C90**		**C90**		**C90**		**C90**	
2,3,4,4',5 - PeCB	**114**	**U**		**U**		**U**		**U**		**R**	**0.55**
2,3,4,4',6 - PeCB	115	C110		C110		C110		C110		C110	
2,3,4,5,6 - PeCB	116	C85		C85		C85		C85		C85	
2,3,4',5,6 - PeCB	117	C85		C85		C85		C85		C85	
2,3',4,4',5 - PeCB	**118**	**R**	**0.45**		**4.4**		**3.7**	**R**	**4.4**		**21**
2,3',4,4',6 - PeCB	**119**	**C86**		**C86**		**C86**		**C86**		**C86**	
2,3',4,5,5' - PeCB	**120**	**U**		**U**		**U**		**U**		**U**	
2,3',4,5',6 - PeCB	121	U		U		U		R	0.084	U	
2',3,3',4,5 - PeCB	122	U		U		U		U		U	
2',3,4,4',5 - PeCB	123	U		U		U		R	0.16	U	
2',3,4,5,5' - PeCB	**124**	**C107**		**C107**		**C107**		**C107**		**C107**	
2',3,4,5,6' - PeCB	**125**	**C86**		**C86**		**C86**		**C86**		**C86**	
3,3',4,4',5 - PeCB	**126**	**U**		**U**		**U**		**U**		**U**	
3,3',4,5,5' - PeCB	127	U		U		U		U		U	
2,2',3,3',4,4' - HxCB	128	CU		CR	1.2	CU		CR	0.42	C	4.6
2,2',3,3',4,5 - HxCB	129	CR	0.49	C	5.8	C	4.5	C	3.6	C	31
2,2',3,3',4,5' - HxCB	**130**	**R**	**0.16**		**0.50**	**U**		**R**	**0.18**		**1.7**
2,2',3,3',4,6 - HxCB	**131**	**U**		**U**		**U**		**U**		**U**	
2,2',3,3',4,6' - HxCB	**132**	**R**	**0.13**	**R**	**1.6**	**R**	**1.2**	**R**	**0.90**		**10**
2,2',3,3',5,5' - HxCB	133	U		R	0.16	U		U		U	
2,2',3,3',5,6 - HxCB	134	CR	0.089	CR	0.38	CU		CR	0.16	C	1.5
2,2',3,3',5,6' - HxCB	135	CU		CR	3.0	C	2.0	C	1.2	C	10
2,2',3,3',6,6' - HxCB	**136**	**U**		**R**	**0.82**	**U**		**U**		**U**	
2,2',3,4,4',5 - HxCB	**137**	**U**			**0.16**		**0.33**	**U**		**R**	**0.87**
2,2',3,4,4',5' - HxCB	**138**	**C129**		**C129**		**C129**		**C129**		**C129**	
2,2',3,4,4',6 - HxCB	139	CU		CU		CU		CU		CU	
2,2',3,4,4',6' - HxCB	140	C139		C139		C139		C139		C139	
2,2',3,4,5,5' - HxCB	141	R	0.12	R	1.3		1.0		0.77		6.3
2,2',3,4,5,6 - HxCB	**142**	**U**		**U**		**U**		**U**		**U**	
2,2',3,4,5,6' - HxCB	**143**	**C134**		**C134**		**C134**		**C134**		**C134**	
2,2',3,4,5',6 - HxCB	**144**	**U**			**0.60**	**R**	**0.32**	**R**	**0.10**		**1.4**

		Blank		Bear River							
Sample Descripton:		Lab Blank		Bear River (site 1)		Bear River (site 2)		Bear River (site 3)		Bear River (site 4)	
Sample Date:				06-Nov-1998		06-Nov-1998		06-Nov-1998		06-Nov-1998	
Latitude/Longitude:				55°15'04" 118°54'03"		55°13'45" 118°52'53"		55°12'02" 118°50'39"		55°07'18" 118°44'31"	
Lab No.		WG2432-1 i		L2248-1 i		L2248-2 i		L2248-3 i		L2248-4 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3,4,6,6' - HxCB	145	U		U		U		R	0.077	U	
2,2',3,4',5,5' - HxCB	146	U		R	1.2	R	1.4	R	0.43		4.2
2,2',3,4',5,6 - HxCB	147	CR	0.65	C	6.1	CR	4.4	C	3.6	C	25
2,2',3,4',5,6' - HxCB	**148**	**U**		**U**		**U**		**U**		**U**	
2,2',3,4',5',6 - HxCB	**149**	**C147**		**C147**		**C147**		**C147**		**C147**	
2,2',3,4',6,6' - HxCB	**150**	**U**		**U**		**U**		**U**		**U**	
2,2',3,5,5',6 - HxCB	151	C135		C135		C135		C135		C135	
2,2',3,5,6,6' - HxCB	152	U		U		U		U		U	
2,2',4,4',5,5' - HxCB	153	CR	0.62	C	6.8	C	5.2	CR	3.4	C	25
2,2',4,4',5,6' - HxCB	**154**	**C135**		**C135**		**C135**		**C135**		**C135**	
2,2',4,4',5,6' - HxCB	**155**	**U**		**U**		**R**	**0.10**	**U**		**R**	**0.098**
2,3,3',4,4',5 - HxCB	**156**	**C**	**0.11**	**CR**	**0.96**	**CR**	**0.64**	**C**	**0.87**	**C**	**4.5**
2,3,3',4,4',5' - HxCB	157	C156		C156		C156		C156		C156	
2,3,3',4,4',6 - HxCB	158	R	0.047	R	0.58	R	0.47	R	0.38		3.1
2,3,3',4,5,5' - HxCB	159	U		U		U			0.11		0.53
2,3,3',4,5,6 - HxCB	**160**	**C129**		**C129**		**C129**		**C129**		**C129**	
2,3,3',4,5',6 - HxCB	**161**	**R**	**0.093**	**U**		**U**		**U**		**U**	
2,3,3',4',5,5' - HxCB	**162**	**R**	**0.045**	**U**		**U**		**U**			**0.27**
2,3,3',4',5,6 - HxCB	163	C129		C129		C129		C129		C129	
2,3,3',4',5',6 - HxCB	164	U		R	0.40	U		R	0.15		2.5
2,3,3',5,5',6 - HxCB	165	U		U		U		U		U	
2,3,4,4',5,6 - HxCB	**166**	**C128**		**C128**		**C128**		**C128**		**C128**	
2,3',4,4',5,5' - HxCB	**167**	**U**			**0.24**	**R**	**0.28**	**R**	**0.23**	**R**	**1.4**
2,3',4,4',5',6 - HxCB	**168**	**C153**		**C153**		**C153**		**C153**		**C153**	
3,3',4,4',5,5' - HxCB	169	R	0.22		0.32	R	0.57	R	0.33	R	0.42
2,2',3,3',4,4',5 - HpCB	170	R	0.33	R	2.4	R	2.0	R	1.1		10
2,2',3,3',4,4',6 - HpCB	171	CR	0.22	C	0.99	CR	0.86	CR	0.56	C	5.8
2,2',3,3',4,5,5' - HpCB	**172**	**U**		**R**	**0.28**	**R**	**0.56**	**R**	**0.42**	**R**	**1.7**
2,2',3,3',4,5,6 - HpCB	**173**	**C171**		**C171**		**C171**		**C171**		**C171**	
2,2',3,3',4,5,6' - HpCB	**174**	**R**	**0.57**		**3.4**		**2.2**	**R**	**2.8**		**13**
2,2',3,3',4,5',6 - HpCB	175	U		R	0.12	R	0.23	R	0.14		0.35
2,2',3,3',4,6,6' - HpCB	176	U		R	0.31	U		R	0.27	R	1.4
2,2',3,3',4',5,6 - HpCB	177	U		R	1.6		1.5	R	1.6		7.6
2,2',3,3',5,5',6 - HpCB	**178**	**U**			**0.81**	**R**	**0.26**	**R**	**0.30**		**2.2**
2,2',3,3',5,6,6' - HpCB	**179**	**R**	**0.27**		**1.3**	**R**	**0.49**	**R**	**0.83**		**4.6**
2,2',3,4,4',5,5' - HpCB	**180**	**CR**	**1.0**	**C**	**7.7**	**C**	**5.0**	**CR**	**3.9**	**C**	**27**
2,2',3,4,4',5,6 - HpCB	181	U		R	0.14	U		U		R	0.31
2,2',3,4,4',5,6' - HpCB	182	U		R	0.32	U		R	0.11	R	0.26
2,2',3,4,4',5',6 - HpCB	183	CR	0.23	C	2.6	CR	1.7	C	1.7	C	7.5
2,2',3,4,4',6,6' - HpCB	**184**	**U**		**R**	**0.068**	**U**		**U**		**U**	
2,2',3,4,5,5',6 - HpCB	**185**	**C183**		**C183**		**C183**		**C183**		**C183**	
2,2',3,4,5,6,6' - HpCB	**186**	**R**	**0.14**	**U**		**R**	**0.15**	**U**		**U**	
2,2',3,4',5,5',6 - HpCB	187	R	0.14		4.7	R	2.9	R	2.5		12
2,2',3,4',5,6,6' - HpCB	188	U		U		R	0.12	U		U	
2,3,3',4,4',5,5' - HpCB	189	U		U		U		U		U	
2,3,3',4,4',5,6 - HpCB	**190**	**R**	**0.18**	**R**	**0.44**	**R**	**1.3**	**R**	**1.4**	**R**	**4.3**
2,3,3',4,4',5',6 - HpCB	**191**	**U**		**U**		**R**	**0.21**	**U**		**R**	**0.47**
2,3,3',4,5,5',6 - HpCB	**192**	**U**		**R**	**0.11**	**U**		**U**		**U**	

		Blank		Bear River							
Sample Descripton:		Lab Blank		Bear River (site 1)		Bear River (site 2)		Bear River (site 3)		Bear River (site 4)	
Sample Date:				06-Nov-1998		06-Nov-1998		06-Nov-1998		06-Nov-1998	
Latitude/Longitude:				55°15'04" 118°54'03"		55°13'45" 118°52'53"		55°12'02" 118°50'39"		55°07'18" 118°44'31"	
Lab No.		WG2432-1 i		L2248-1 i		L2248-2 i		L2248-3 i		L2248-4 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,3,3',4',5,5',6 - HpCB	193	C180		C180		C180		C180		C180	
2,2',3,3',4,4',5,5' - OcCB	194	R	0.39	R	2.3		1.1	R	1.2	R	5.0
2,2',3,3',4,4',5,6 - OcCB	195	U		U		U		U		R	2.2
2,2',3,3',4,4',5,6' - OcCB	196	R	0.37	R	0.94	R	0.82	R	0.83	R	3.6
2,2',3,3',4,4',6,6' - OcCB	197	CU		CR	0.16	CU		CR	0.18	CR	0.49
2,2',3,3',4,5,5',6 - OcCB	198	CU		C	3.0	CR	4.0	CR	2.4	C	10
2,2',3,3',4,5,5',6' - OcCB	199	C198		C198		C198		C198		C198	
2,2',3,3',4,5,6,6' - OcCB	200	C197		C197		C197		C197		C197	
2,2',3,3',4,5',6,6' - OcCB	201	R	0.18	R	0.58	R	0.37	R	0.37	R	0.65
2,2',3,3',5,5',6,6' - OcCB	202	U		R	0.67	R	0.51	R	0.50	R	1.3
2,2',3,4,4',5,5',6 - OcCB	203	U			1.30	R	0.46	R	1.2		3.6
2,2',3,4,4',5,6,6' - OcCB	204	R	1.3		1.60	R	1.6		1.3		1.1
2,3,3',4,4',5,5',6 - OcCB	205	U		U		U		U		U	
2,2',3,3',4,4',5,5',6 - NoCB	206	U		U		U		U		U	
2,2',3,3',4,4',5,6,6' - NoCB	207	U		U		U		U		U	
2,2',3,3',4,5,5',6,6' - NoCB	208	U		U		U		U		U	
2,2',3,3',4,4',5,5',6,6' - DeCB	209	R	0.31	R	0.93	R	2.4	R	0.60		1.4
ΣPCBs[1]			2.38		94.53		53.99		109.51		513.72

[1]Excludes R flagged values

[2]Concentration as pg/g dry wt.

Flag: U = Not Detected; R = Peak detected but not confirmed by ratio; C = Coelutes with

Analysis by Axys Analytical Services Ltd., Jan-Mar 2000

	Bear River								Blank	
	Bear River (site 4) 06-Nov-1998 55°07'18" 118°44'31" [Dupl.extract.&anal.]		Bear River (site 5) 06-Nov-1998 55°09'20" 118°37'07" L2248-5 i		Bear River (site 6) 06-Nov-1998 55°09'17" 118°36'47" L2248-6 i		Bear River (site 7) 09-Nov-1998 55°06'28" 118°28'21" L2248-7 i		Lab Blank WG2433-1	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1	R	1.2		0.95	R	0.81	R	1.0	R	1.1
2	R	0.69	R	0.34		0.65	R	0.43	U	
3		1.6		0.95		0.67	R	0.68	U	
4	U		U		U		U		U	
5	U		U		U		U		U	
6	U		U		U		U		U	
7	U		U		U		U		U	
8		4.3	U		U		U		U	
9	U		U		U		U		U	
10	U		U		U		U		U	
11		8.3	R	3.7	R	5.0		4.2	U	
12	CU		CU		CU		CU		CU	
13	C12		C12		C12		C12		C12	
14	U		U		U		U		U	
15		3.6	U		U		U		U	
16		3.2	R	1.5	U		U		U	
17		2.6	R	2.0	U		U		U	
18	C	5.9	C	2.7	CR	1.7	C	1.5	CU	
19	U		U		U		U		U	
20	C	13	C	5.7	C	4.4	C	4.0	CU	
21	C	5.1	C	3.0	C	1.8	C	2.0	CU	
22		4.2		2.0	R	1.6		1.5	U	
23	U		U		U		U		U	
24	U		U		U		U		U	
25		0.74	U		U		U		U	
26	C	1.7	C	0.78	CU		CU		CU	
27	U		U		U		U		U	
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		9.2		4.4		3.2		2.6		1.3
32		2.0		1.4	R	0.67	U		U	
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35	U		U		U		U		U	
36	U		U		U		U		U	
37		3.9		1.8	R	1.1	R	1.2	U	
38	U		U		U		U		U	
39	U		U		U		U		U	
40	C	22	CR	8.6	C	7.4	C	5.0	CU	
41	C40		C40		C40		C40		C40	
42		2.4	R	1.1	R	0.85	R	0.76	U	
43	U		U		U		U		U	
44	C	8.9	C	4.8	C	3.4	CR	4.0	C	0.51
45	CR	1.8	C	0.84	C	0.72	CR	0.32	CU	
46	R	0.89	R	0.30	U			0.39	U	
47	C44		C44		C44		C44		C44	
48		2.0	R	0.9	R	0.72		0.65	U	

	Bear River								Blank	
	Bear River (site 4) 06-Nov-1998 55°07'18" 118°44'31" [Dupl.extract.&anal.]		Bear River (site 5) 06-Nov-1998 55°09'20" 118°37'07" L2248-5 i		Bear River (site 6) 06-Nov-1998 55°09'17" 118°36'47" L2248-6 i		Bear River (site 7) 09-Nov-1998 55°06'28" 118°28'21" L2248-7 i		Lab Blank WG2433-1	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	C	5.3	C	2.5	C	1.6	C	1.5	CU	
50	C	1.4	C	0.66	CR	0.48	CU		CU	
51	C45		C45		C45		C45		C45	
52		13		6.6	R	3.8	R	2.7	R	0.79
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56		2.9	R	1.9		1.1	R	1.2	U	
57	U		U		U		U		U	
58	U		U		U		U		U	
59	C	0.62	CR	0.37	C	0.23	CR	0.31	CU	
60		1.5		0.82	R	0.43	U		U	
61	C	13	C	7.9	C	4.6	C	3.9	CU	
62	C59		C59		C59		C59		C59	
63	U		U		U		U		U	
64		4.1		2.3		1.8	R	1.2	U	
65	C44		C44		C44		C44		C44	
66		6.4		2.9		2.4		1.8	U	
67	U		U		U		U		U	
68	U		U		U		U		U	
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77		1.5		0.65	R	0.76	R	0.55	U	
78	U		U		U		U		U	
79	U		U		U		U		U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82		2.6	R	1.5	R	0.98	R	0.58	R	0.50
83	C	9.8	C	6.5	CR	3.0	C	2.4	CR	0.43
84		7.3		4.4		2.2	R	2.2	R	0.28
85	C	3.6	CR	2.3	C	0.99	CR	0.80	CR	0.24
86	C	14	C	8.2	C	5.6	CR	3.3	CR	0.55
87	C86		C86		C86		C86		C86	
88	C	2.6	C	2.0	CR	0.93	CR	0.61	CU	
89	R	0.25	U		U		U		U	
90	C	23	C	16	C	8.1	C	5.3	C	1.0
91	C88		C88		C88		C88		C88	
92		3.9		2.1	R	1.6	R	1.1	U	
93	C	21	C	16	C	6.3	C	4.1	CR	0.87
94	U		U		U		U		U	
95	C93		C93		C93		C93		C93	
96	R	0.13	R	0.13	U		U		U	

	Bear River								Blank	
	Bear River (site 4) 06-Nov-1998 55°07'18" 118°44'31" [Dupl.extract.&anal.]		Bear River (site 5) 06-Nov-1998 55°09'20" 118°37'07" L2248-5 i		Bear River (site 6) 06-Nov-1998 55°09'17" 118°36'47" L2248-6 i		Bear River (site 7) 09-Nov-1998 55°06'28" 118°28'21" L2248-7 i		Lab Blank WG2433-1	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93	
103		0.25	U		U		U		U	
104	U		U		U		U		U	
105		9.1		5.2		3.4		2.5		2.7
106	U		U		U		U		U	
107	CR	0.87	CR	0.52	CU		CU		CU	
108	C86		C86		C86		C86		C86	
109	R	1.3	R	0.63		0.48		0.32	U	
110	C	31	C	18	C	10	C	6.8	CR	1.8
111	U		U		U		U		U	
112	U		U		U		U		U	
113	C90		C90		C90		C90		C90	
114	U		R	0.30	U		U		U	
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		23		12		8.6		5.9	R	4.8
119	C86		C86		C86		C86		C86	
120	R	0.16	U		U		U		U	
121	U		U		U		U		U	
122	U		U		U		U		U	
123	R	0.53	U		U		U		U	
124	C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86	
126	U		U		U		U		U	
127	U		U		U		U		U	
128	C	4.2	C	2.3	C	1.7	CR	1.4	C	2.3
129	C	31	C	17	C	12	C	8.0	C	9.7
130	R	2.0	R	0.99		0.87	R	0.45	R	0.42
131	U		U		U		R	0.19	U	
132		11		6.2	R	4.2	R	2.9	R	1.5
133	R	0.43	U		U		U		U	
134	C	1.7	CR	0.85	C	0.80	C	0.48	CU	
135	C	9.7	C	6.0	C	4.2	C	2.3	CR	0.45
136	U		R	2.7		1.5		0.89	R	0.28
137		1.2	R	0.58	R	0.52	R	0.35	R	0.58
138	C129		C129		C129		C129		C129	
139	C	0.47	CU		CU		CR	0.27	CU	
140	C139		C139		C139		C139		C139	
141		6.6		4.3	R	2.6		1.4		1.3
142	U		U		U		U		U	
143	C134		C134		C134		C134		C134	
144		1.5		0.85	U		R	0.57	U	

	Bear River								Blank	
	Bear River (site 4) 06-Nov-1998 55°07'18" 118°44'31" [Dupl.extract.&anal.]		Bear River (site 5) 06-Nov-1998 55°09'20" 118°37'07" L2248-5 i		Bear River (site 6) 06-Nov-1998 55°09'17" 118°36'47" L2248-6 i		Bear River (site 7) 09-Nov-1998 55°06'28" 118°28'21" L2248-7 i		Lab Blank WG2433-1	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	U		U		U		R	0.096	U	
146		4.2		2.8	R	1.9	R	1.3	U	
147	C	25	C	16	C	10	C	6.6	CR	2.1
148	**U**		**U**		**U**		**R**	**0.13**	**U**	
149	**C147**		**C147**		**C147**		**C147**		**C147**	
150	**U**		**U**		**U**		**U**		**U**	
151	C135		C135		C135		C135		C135	
152	R	0.10	U		U		U		U	
153	C	25	C	15	C	10	C	7.1	C	4.0
154	**C135**		**C135**		**C135**		**C135**		**C135**	
155	**U**		**U**		**U**		**U**		**U**	
158	**C**	**4.2**	**C**	**3.1**	**C**	**1.9**	**C**	**1.1**	**C**	**3.2**
157	C156		C156		C156		C156		C156	
158		3.2		1.9		1.2	R	0.99	R	0.72
159		0.31	U		U		R	0.17	U	
160	**C129**		**C129**		**C129**		**C129**		**C129**	
161	**U**		**U**		**U**		**U**		**U**	
162	**R**	**0.27**	**U**		**U**		**U**			**0.15**
163	C129		C129		C129		C129		C129	
164		2.7	R	1.5	R	1.0		0.95	R	0.57
165	U		U		U		U		U	
166	**C128**		**C128**		**C128**		**C128**		**C128**	
167		**1.5**	**R**	**0.81**	**R**	**0.62**	**R**	**0.46**		**0.68**
168	**C153**		**C153**		**C153**		**C153**		**C153**	
169	R	0.28	U		R	0.26	R	0.20	U	
170		9.8		6.8		4.6	R	2.8	R	1.8
171	C	3.4	CR	2.6	CR	1.7	C	1.6	CU	
172	**R**	**2.3**	**R**	**1.6**	**R**	**0.43**	**R**	**0.85**		**0.40**
173	**C171**		**C171**		**C171**		**C171**		**C171**	
174		**12**	**R**	**8.2**	**R**	**4.5**		**2.8**	**R**	**0.66**
175	R	0.32	R	0.29	U		R	0.27	U	
176	R	1.6	R	1.2	R	0.41	R	0.22	U	
177	R	5.5		4.8		3.5	R	2.4	R	0.32
178		**1.9**	**R**	**1.3**	**R**	**1.0**		**1.0**	**U**	
179		**4.1**	**R**	**2.7**	**R**	**2.1**	**R**	**1.1**	**R**	**0.23**
180	**C**	**25**	**C**	**16**	**C**	**14**	**C**	**6.6**	**CR**	**1.5**
181	R	0.44	U		U		U		U	
182	U		U		R	0.22	U		U	
183	CR	6.1	C	3.5	C	3.1	C	1.7	CR	0.32
184	**U**		**U**		**U**		**U**		**U**	
185	**C183**		**C183**		**C183**		**C183**		**C183**	
186	**U**		**U**		**U**		**U**		**U**	
187		12		8.1	R	5.4	R	3.1	R	0.75
188	U		U		U		U		U	
189	U		U		U		U		U	
190	**R**	**4.3**	**U**		**R**	**2.5**	**R**	**1.9**	**U**	
191	**R**	**0.51**	**R**	**0.58**	**U**		**U**		**R**	**0.33**
192	**U**		**U**		**U**		**R**	**0.10**	**R**	**0.20**

	Bear River								Blank	
	Bear River (site 4) 06-Nov-1998 55°07'18" 118°44'31" [Dupl.extract.&anal.]		Bear River (site 5) 06-Nov-1998 55°09'20" 118°37'07" L2248-5 i		Bear River (site 6) 06-Nov-1998 55°09'17" 118°36'47" L2248-6 i		Bear River (site 7) 09-Nov-1998 55°06'28" 118°28'21" L2248-7 i		Lab Blank WG2433-1	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
193	C180		C180		C180		C180		C180	
194	R	4.3		3.7		2.6	R	1.7	U	
195	R	1.9	R	1.5	R	1.5		0.71	U	
196	R	2.8	R	1.8	R	2.0	R	1.0	U	
197	CR	0.90	CU		CR	0.25	CR	0.42	CU	
198	C	6.8	CR	3.9	C	5.7	CR	3.1	CU	
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201	R	1.2	U		R	0.43	U		U	
202		1.2		0.72	R	0.60	U		U	
203	R	3.2	R	2.5	R	2.4		1.1	U	
204		1.4	R	1.3	R	0.71	R	1.2	R	0.97
205	U		U		U		R	0.34	U	
206	U		U		U		U		U	
207	U		U		U		U		U	
208	U		U		U		U		U	
209	R	0.85	R	0.79	R	0.80	U		U	
ΣPCBs		516.79		263.12		157.11		100.69		27.24

	Bear River						Wapiti River			
	Bear River (site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-8 i		Bear River (site 9) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-9		Bear River (site 10) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-10		Wapiti River, STP to WeyCan CW (site 1) 01-Oct-1997 55°03'50" 118°41'14" L2248-12		Wapiti River, STP to WeyCan CW (site 2) 01-Oct-1997 55°04'40" 118°46'36" L2248-13	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1	R	1.7	R	1.8		1.9		2.3	R	0.90
2		2.6	R	2.8		4.0	U		R	0.54
3	R	2.2		2.3	R	2.7		1.2	R	1.1
4	U		U		U		U		U	
5	U		U		U		U		U	
6	U		U		U		U		U	
7	U		U		U		U		U	
8		5.2		6.1		6.3	U		U	
9	U		U		U		U		U	
10	U		U		U		U		U	
11		13		14		18	U		U	
12	CU		CR	3.9	CU		CU		CU	
13	C12		C12		C12		C12		C12	
14	U		U		U		U		U	
15		4.8		4.6		5.6	U		U	
16		4.2	R	3.4		2.9	U		U	
17	R	3.5		3.8		3.9	U		U	
18	C	7.9	C	7.3	C	6.6	CU		CR	1.5
19	U		U		U		U		U	
20	C	18	C	17	C	19	C	1.8	C	1.4
21	CR	8.5	C	8.6	C	8.9	CU		CR	0.99
22		6.0		6.1		5.8	U		U	
23	U		U		U		U		U	
24	U		U		U		U		U	
25	U		U			1.1	U		U	
26	CR	2.5	C	1.9	C	2.4	CU		CU	
27	U		U		U		U		U	
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		11		13		13	U		R	1.3
32		2.3		2.5		2.1	U		U	
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35	U		U		U		U		U	
36	U		U		U		U		U	
37	R	5.3		6.0		6.0	U		U	
38		2.9		3.7		3.7	U			0.78
39	U		U		U		U		U	
40	C	25	CR	24	C	5.3	CU		CU	
41	C40		C40		C40		C40		C40	
42	R	4.1		3.7		3.3	U		R	0.34
43	U		U		U		U		U	
44	C	15	C	12	C	14	C	2.6	C	2.0
45	CR	2.2	C	2.4	CR	2.4	CU		CR	0.27
46	R	0.91	R	0.78	U		U		U	
47	C44		C44		C44		C44		C44	
48	R	3.0		2.5		2.9	U		R	0.27

	Bear River						Wapiti River			
	Bear River (site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-8 i		Bear River (site 9) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-9		Bear River (site 10) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-10		Wapiti River, STP to WeyCan CW (site 1) 01-Oct-1997 55°03'50" 118°41'14" L2248-12		Wapiti River, STP to WeyCan CW (site 2) 01-Oct-1997 55°04'40" 118°46'36" L2248-13	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	CR	7.8	C	6.8	C	7.4	CU		CR	1.0
50	CR	1.5	C	1.5	C	1.9	CU		CU	
51	C45		C45		C45		C45		C45	
52		16		15		16	U			1.6
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56		4.9		4.2		4.8	U		R	0.30
57	U		U		U		U		U	
58	U		U		U		U		U	
59	CR	1.0	C	0.89	CR	0.92	CU		CR	0.20
60		2.3		2.6	R	2.4	U		U	
61	C	20	C	19	C	23	CR	0.77	C	1.7
62	C59		C59		C59		C59		C59	
63	U		U		U		U		U	
64		5.6		5.4		6.3	R	0.80		0.51
65	C44		C44		C44		C44		C44	
66		10		9.3		9.8	U		R	0.70
67	U		U		U		U		U	
68	U		U		U		U		U	
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77		2.4		2.4		2.1	U		R	0.36
78	U		U		U		U		U	
79	U		U		U		U		U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82	R	3.6	R	3.6		3.3	U		U	
83	C	15	C	13	C	13	CR	0.89	C	0.58
84		7.8		8.2		7.1	R	0.70	R	0.53
85	C	5.0	C	3.8	CR	3.5	CR	0.28	CU	
86	C	20	C	19	C	18	CR	0.67	CR	0.67
87	C86		C86		C86		C86		C86	
88	C	3.2	C	3.3	C	3.6	CU		CU	
89	U		U			0.28	U		R	0.17
90	C	28	C	28	C	27	CR	1.4	CR	1.5
91	C88		C88		C88		C88		C88	
92	R	4.5	R	4.5		5.3	R	0.43	R	0.17
93	C	26	CR	22	C	21	CR	1.2	CR	1.8
94	U		U		U		U		U	
95	C93		C93		C93		C93		C93	
96	R	0.10	R	0.17	R	0.17	U		U	

	Bear River						Wapiti River			
	Bear River (site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-8 i		Bear River (site 9) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-9		Bear River (site 10) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-10		Wapiti River, STP to WeyCan CW (site 1) 01-Oct-1997 55°03'50" 118°41'14" L2248-12		Wapiti River, STP to WeyCan CW (site 2) 01-Oct-1997 55°04'40" 118°46'36" L2248-13	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93	
103	R	0.22	U		U		U		U	
104	R	0.10	R	0.11	U		U		R	0.052
105		12		13		13	R	2.0	R	0.96
106	U		U		U		R	0.10	U	
107	CR	1.2	C	1.5	CR	0.62	CR	0.18	CU	
108	C86		C86		C86		C86		C86	
109	R	1.3	R	1.8		2.0	R	0.30	U	
110	C	39	CR	35	CR	35	C	2.0	C	1.6
111	U		U		U		U		U	
112	U		U		U		U		U	
113	C90		C90		C90		C90		C90	
114	R	0.90	U			1.1	R	0.21	U	
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		30		32		31		3.4		1.6
119	C86		C86		C86		C86		C86	
120	U		U		U		U		U	
121	U		U		U		U		U	
122	U		U		R	0.45	R	0.23	U	
123	U		U		R	0.60	R	0.12	U	
124	C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86	
126	U		U		U		U		U	
127	U		U		U		R	0.12	U	
128	C	6.4	C	9.1	C	7.1	C	1.3	C	0.30
129	C	36	C	47	C	41	C	4.6	C	2.1
130		2.3		3.1	R	2.2	U		R	0.23
131	U		U		U		U		U	
132	R	14		14		13	R	1.0	R	0.63
133	R	0.40	U		R	0.72	U		U	
134	CR	2.2	C	2.0	CR	2.0	CU		CU	
135	C	11	C	10	C	11	CR	0.36	CR	0.85
136	R	4.8		5.0		3.7	U		R	0.37
137		1.9		2.4		2.3	U		U	
138	C129		C129		C129		C129		C129	
139	C	0.78	CR	0.48	CR	0.65	CU		CU	
140	C139		C139		C139		C139		C139	
141		7.2		7.9		8.1	R	0.52	R	0.26
142	U		U		U		U		U	
143	C134		C134		C134		C134		C134	
144		1.6	R	1.8	R	1.5	U		U	

	Bear River						Wapiti River			
	Bear River (site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-8 i		Bear River (site 9) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-9		Bear River (site 10) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-10		Wapiti River, STP to WeyCan CW (site 1) 01-Oct-1997 55°03'50" 118°41'14" L2248-12		Wapiti River, STP to WeyCan CW (site 2) 01-Oct-1997 55°04'40" 118°46'36" L2248-13	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	R	0.12	U		U		U		U	
146	R	5.4		2.6	R	5.8	U		R	0.30
147	C	26	C	30	C	31	CR	1.4	CR	1.3
148	U		U		U		U		U	
149	C147		C147		C147		C147		C147	
150	R	0.088	U		U		U		U	
151	C135		C135		C135		C135		C135	
152	U		R	0.13	U		U		U	
153	C	31	C	31	C	33	C	2.3	C	1.3
154	C135		C135		C135		C135		C135	
155	U		U		U		U		R	0.075
156	CR	5.4	C	7.0	C	6.5	C	2.4	C	0.40
157	C156		C156		C156		C156		C156	
158		4.3		4.7	R	4.7	R	0.41	R	0.17
159	U		R	0.48	R	0.31	U		U	
160	C129		C129		C129		C129		C129	
161	U		R	2.0	U		U		U	
162	R	0.25	U		U		U		U	
163	C129		C129		C129		C129		C129	
164		2.3	R	4.1	R	2.6		0.30	R	0.15
165	R	0.057	U		U		U		U	
166	C128		C128		C128		C128		C128	
167	R	1.7		3.1		2.1	R	0.70	U	
168	C153		C153		C153		C153		C153	
169	R	1.0		0.58	R	1.7	U		U	
170	R	11		11		8.7		2.8	R	0.30
171	CR	3.7	C	4.4	CR	2.3	CR	1.6	CR	0.15
172		1.8		2.7		2.5	U			0.15
173	C171		C171		C171		C171		C171	
174		11	R	11		9.7		0.79	R	1.2
175	U		U		U		R	0.19	U	
176	U		U		U		U		U	
177		6.5		6.4		5.0	R	0.47	R	0.34
178		2.2	U			2.6	R	0.24	U	
179	U			3.7	R	3.7	R	0.28	R	0.21
180	C	23	CR	27	CR	21	CR	3.3	CR	0.65
181	U		U		U		R	0.99	U	
182	U		U		U		U		U	
183	CR	6.2	C	6.4	CR	5.9	CR	0.35	CR	0.39
184	U		U		U		U		U	
185	C183		C183		C183		C183		C183	
186	U		U		U		U		U	
187		12		12		11	R	0.67		0.65
188	U		U		U		R	0.093	U	
189	U		U		U		U		U	
190	U		R	2.3	R	5.1	R	0.41	R	1.1
191	R	0.73	U		U		R	0.28	U	
192	U		U		U		R	0.20	U	

	Bear River						Wapiti River			
	Bear River (site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-8 i		Bear River (site 9) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-9		Bear River (site 10) (split of site 8) 09-Nov-1998 55°10'41" 118°48'50" L2248-10		Wapiti River, STP to WeyCan CW (site 1) 01-Oct-1997 55°03'50" 118°41'14" L2248-12		Wapiti River, STP to WeyCan CW (site 2) 01-Oct-1997 55°04'40" 118°46'36" L2248-13	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
193	C180		C180		C180		C180		C180	
194	R	6.3		5.5	R	4.8		0.63	U	
195		2.2	R	1.9		2.0	U		U	
196		3.0	R	2.8	R	3.5	U		U	
197	CU		CU		CU		CU		CU	
198	C	9.3	CR	5.8	C	9.5	CR	0.32	CR	0.35
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201	R	0.92	R	0.68		1.3	U		U	
202	U		R	1.3	R	1.7	U		U	
203		4.5	R	3.0	R	3.3	R	0.36	U	
204	R	1.5		1.8		1.7	R	2.2	R	0.80
205	U		R	0.74	U		U		U	
206	U		U		U		U		U	
207	U		U		U		U		U	
208	U		U		U		U		U	
209	R	1.2	R	2.2	R	2.3	U		U	
ΣPCBs		571.38		539.77		566.48		28.42		16.67

	Wapiti River									
	Wapiti River, WeyCan CW to FE (site 1) 01-Oct-1997 55°03'49" 118°41'42" L2248-11		Wapiti River, WeyCan CW to FE (site 2) 01-Oct-1997 55°03'32" 118°39'39" L2248-14		Wapiti River, WeyCan FE to RR br. (site 1) 30-Sep-1997 55°03'46" 118°38'38" L2248-15		Wapiti River, RR br. To Bear River (site 1) 30-Jun-1997 55°04'19" 118°37'10" L2248-16		Wapiti River, Bear River to Wapiti mouth (site 1) 08-Oct-1997 55°07'06" 118°27'01" L2248-17	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1		6.0		0.87		1.7	R	0.83		0.88
2	R	0.65	U			0.73	U			0.37
3		6.1		0.77	R	1.3		0.53		0.70
4	U		U		U		U		U	
5	U		U		U		U		U	
6	U		U		U		U		U	
7	U		U		U		U		U	
8		6.2	U			2.9	U		U	
9	U		U		U		U		U	
10	U		U		U		U		U	
11	U		U		U		U		U	
12	CU		CU		CU		CU		CU	
13	C12		C12		C12		C12		C12	
14	U		U		U		U		U	
15		5.2	U		U		U		U	
16		3.3	U		U		U		U	
17		3.3	U		U		U		U	
18	C	6.8	CR	1.4	C	1.2	CU		C	0.93
19	U		U		U		U		U	
20	C	11	C	1.6	C	2.1	C	1.5	C	1.8
21	C	6.0	CU		CU		CU		CR	0.60
22		4.3	U		U		U		U	
23	U		U		U		U		U	
24	U		U		U		U		U	
25	U		U		U		U		U	
26	CR	1.4	CU		CU		CU		CU	
27	U		U		U		U		U	
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		9.6		1.1		1.6		1.1		1.3
32		2.4	U		U		U		U	
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35	U		U		U		U		U	
36	U		U		U		U		U	
37		4.0	U		U		U		U	
38	U		U		U		R	0.67	U	
39	U		U		U		U		U	
40	C	17	CU		CR	3.1	CU		C	1.8
41	C40		C40		C40		C40		C40	
42	R	2.5	U		U		U		U	
43	U		U		U		U		U	
44	C	8.3	CR	1.5	C	3.1	CR	1.3	CR	1.8
45	C	1.7	CU		CR	0.63	CU		CU	
46	U		U		U		U		U	
47	C44		C44		C44		C44		C44	
48	R	1.9	U		R	0.38	U		R	0.29

	Wapiti River									
	Wapiti River, WeyCan CW to FE (site 1) 01-Oct-1997 55°03'49" 118°41'42" L2248-11		Wapiti River, WeyCan CW to FE (site 2) 01-Oct-1997 55°03'32" 118°39'39" L2248-14		Wapiti River, WeyCan FE to RR br. (site 1) 30-Sep-1997 55°03'46" 118°38'38" L2248-15		Wapiti River, RR br. To Bear River (site 1) 30-Jun-1997 55°04'19" 118°37'10" L2248-16		Wapiti River, Bear River to Wapiti mouth (site 1) 08-Oct-1997 55°07'06" 118°27'01" L2248-17	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	CR	4.3	CU		CR	1.1	C	0.48	C	0.91
50	CR	1.1	CU		CU		CU		CU	
51	C45		C45		C45		C45		C45	
52		7.6		1.2		2.6		1.5	R	2.2
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56		3.7	U		U		U			0.66
57	U		U		U		U		U	
58	U		U		U		U		U	
59	C	0.49	CU		CU		CU		CU	
60		1.9	U		U		U		U	
61	C	11	C	1.2	C	3.7	C	1.2	C	3.0
62	C59		C59		C59		C59		C59	
63	U		U		U		U		U	
64		3.7	R	0.44	U		R	0.27		0.79
65	C44		C44		C44		C44		C44	
66		4.4		0.41	R	1.5	R	0.59		1.0
67	U		U		U		U		U	
68	U		U		U		U		U	
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77		1.1	U		U		U		U	
78	U		U		U		U		U	
79	U		U		U		U		U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82		2.0	U			0.52	R	0.21		1.1
83	C	4.0	CR	0.83	CR	2.8	CR	0.68	C	2.8
84	R	2.6	R	0.19	R	1.5		0.19	R	1.6
85	CR	1.6	CU		C	0.83	C	0.24	C	0.85
86	CR	6.2	C	0.73	C	3.0	C	1.0	C	4.1
87	C86		C86		C86		C86		C86	
88	CR	1.5	CU		C	0.72	CR	0.38	CR	0.81
89	U		U		U			0.089	U	
90	C	6.1	C	1.5	C	4.0	C	1.8	C	4.6
91	C88		C88		C88		C88		C88	
92		1.1		0.34		0.75	R	0.13	R	1.0
93	CR	6.2	C	1.1	CR	3.0	CR	1.7	C	3.0
94	U		U		U		U		U	
95	C93		C93		C93		C93		C93	
96	U		U		U		U		U	

	Wapiti River									
	Wapiti River, WeyCan CW to FE (site 1) 01-Oct-1997 55°03'49" 118°41'42" L2248-11		Wapiti River, WeyCan CW to FE (site 2) 01-Oct-1997 55°03'32" 118°39'39" L2248-14		Wapiti River, WeyCan FE to RR br. (site 1) 30-Sep-1997 55°03'46" 118°38'38" L2248-15		Wapiti River, RR br. To Bear River (site 1) 30-Jun-1997 55°04'19" 118°37'10" L2248-16		Wapiti River, Bear River to Wapiti mouth (site 1) 08-Oct-1997 55°07'06" 118°27'01" L2248-17	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93	
103		0.22	U		U		R	0.069	U	
104	U		U		U		U		U	
105		4.3	R	0.46		3.6	R	1.0		11
106	U		U		U		U		U	
107	CU		CU		CU		CU		CR	0.37
108	C86		C86		C86		C86		C86	
109	U		U		R	0.24	U			0.76
110	CR	8.1	C	1.3	C	5.5	C	1.9	C	9.1
111	U		U		U		U		U	
112	U		U		U		U		U	
113	C90		C90		C90		C90		C90	
114	U		U		U		U		R	0.57
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		6.5		1.2		7.5		2.0		16
119	C86		C86		C86		C86		C86	
120	U		U		U		U		U	
121	U		U		U		U		U	
122	U		R	0.13	U		U			0.21
123	U		U		R	0.3	U			0.30
124	C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86	
126	U		U		U		U		U	
127	U		U		U		U		U	
128	C	1.2	CU		CR	1.8	CR	0.53	C	7.2
129	C	3.8	CR	1.6	C	6.5	CR	2.1	C	29
130	U		U		R	0.43	R	0.085		1.7
131	U		U		U		R	0.12	U	
132		1.6		0.69		1.8	R	0.46		5.1
133	U		U		U		U		U	
134	CU		CU		CR	0.33	CU		CR	0.41
135	CR	1.1	CR	0.29	C	0.76	CR	0.45	C	1.6
136		0.66	U		R	0.37	U			0.53
137	R	0.37	U		U		R	0.13		1.5
138	C129		C129		C129		C129		C129	
139	CU		CU		CU		CU		CU	
140	C139		C139		C139		C139		C139	
141	R	0.83	U		R	0.82	R	0.36		2.8
142	U		U		U		U		U	
143	C134		C134		C134		C134		C134	
144	R	0.34	R	0.086	R	0.19	U		R	0.23

	Wapiti River									
	Wapiti River, WeyCan CW to FE (site 1) 01-Oct-1997 55°03'49" 118°41'42" L2248-11		Wapiti River, WeyCan CW to FE (site 2) 01-Oct-1997 55°03'32" 118°39'39" L2248-14		Wapiti River, WeyCan FE to RR br. (site 1) 30-Sep-1997 55°03'46" 118°38'38" L2248-15		Wapiti River, RR br. To Bear River (site 1) 30-Jun-1997 55°04'19" 118°37'10" L2248-16		Wapiti River, Bear River to Wapiti mouth (site 1) 08-Oct-1997 55°07'06" 118°27'01" L2248-17	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	U		U		U		U		U	
146	U			0.36	R	0.84		0.10		1.8
147	C	2.3	C	1.2	C	2.4	C	1.0	C	4.6
148	**U**		**U**		**U**		**U**		**U**	
149	**C147**		**C147**		**C147**		**C147**		**C147**	
150	**U**		**U**		**U**		**U**		**U**	
151	C135		C135		C135		C135		C135	
152	U		U		R	0.057	U		U	
153	C	2.2	CR	1.5	C	4.3	CR	1.4	C	10
154	**C135**		**C135**		**C135**		**C135**		**C135**	
155		**0.16**	**R**	**0.06**	**U**		**U**		**U**	
156	**C**	**0.97**	**CU**		**CR**	**2.2**	**CR**	**0.78**	**C**	**13**
157	C156		C156		C156		C156		C156	
158	R	0.59	U		R	0.70	R	0.31		3.0
159	U		U		U		R	0.047	U	
160	**C129**		**C129**		**C129**		**C129**		**C129**	
161	**U**		**U**		**U**		**U**		**U**	
162	**U**		**U**		**U**		**U**		**R**	**0.22**
163	C129		C129		C129		C129		C129	
164	R	0.49	U		R	0.29		0.14	R	1.8
165	U		U		U		U		U	
166	**C128**		**C128**		**C128**		**C128**		**C128**	
167		**0.85**	**U**			**0.77**	**R**	**0.11**	**R**	**3.0**
168	**C153**		**C153**		**C153**		**C153**		**C153**	
169	U		R	0.28		0.22	R	0.29	R	0.39
170		1.6	R	0.60	R	1.7	R	0.57	R	9.1
171	CU		CR	0.11	C	0.57	CR	0.29	CR	1.7
172	**U**		**R**	**0.20**	**U**		**U**			**0.77**
173	**C171**		**C171**		**C171**		**C171**		**C171**	
174	**R**	**1.6**	**R**	**0.32**	**R**	**1.7**	**R**	**0.23**	**R**	**3.6**
175	U		R	0.15	U		U		U	
176	U		R	0.12	U		U		R	0.45
177	U			0.57		0.85	R	0.23		2.8
178	**U**		**R**	**0.26**	**U**		**U**		**R**	**0.44**
179	**U**			**0.31**		**0.46**	**U**		**U**	
180	**C**	**3.2**	**CU**		**CU**		**CR**	**0.68**	**C**	**12**
181	U			0.13	U		U		U	
182	U		U		U		U		U	
183	CU		CU		CU		CU		CR	1.8
184	**U**		**U**		**U**		**U**		**U**	
185	**C183**		**C183**		**C183**		**C183**		**C183**	
186	**U**		**U**		**U**		**U**		**U**	
187	R	1.2		0.65	R	1.0	R	0.28		2.5
188	U		R	0.093	U		U		U	
189	U		U		U		U		U	
190	**R**	**6.0**	**R**	**3.1**	**R**	**1.0**	**R**	**1.5**	**R**	**3.5**
191	**U**		**U**		**U**		**U**		**R**	**0.39**
192	**U**		**U**		**U**		**U**		**U**	

	Wapiti River									
	Wapiti River, WeyCan CW to FE (site 1) 01-Oct-1997 55°03'49" 118°41'42" L2248-11		Wapiti River, WeyCan CW to FE (site 2) 01-Oct-1997 55°03'32" 118°39'39" L2248-14		Wapiti River, WeyCan FE to RR br. (site 1) 30-Sep-1997 55°03'46" 118°38'38" L2248-15		Wapiti River, RR br. To Bear River (site 1) 30-Jun-1997 55°04'19" 118°37'10" L2248-16		Wapiti River, Bear River to Wapiti mouth (site 1) 08-Oct-1997 55°07'06" 118°27'01" L2248-17	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
193	C180		C180		C180		C180		C180	
194	U		R	0.46	U			0.40		1.6
195	U		U		U		U			0.66
196	U		R	0.21	R	0.34	U		U	
197	CU		CU		CU		CU		CU	
198	C	3.6	C	0.66	CR	0.35	CR	0.55	C	1.9
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201	R	0.4	R	0.23	U		U		R	0.28
202	R	0.44	U		R	0.42	U		R	0.17
203		0.78	R	0.26	R	0.29	U		R	0.47
204	R	2.4	U		R	1.4	R	1.1	R	1.3
205	U		U		U		U		U	
206	U		U		U		U		U	
207	U		U		U		U		U	
208	U		U		U		U		U	
209	U		U		R	0.54	U			0.53
ΣPCBs		182.43		17.89		64.68		15.169		172.75

Appendix A4 Wapiti River samples from 1989 and 1992: sediment PCB data

		Blank		Wapiti River					
Sample Descripton:		Lab Blank		Wapiti River, at Hwy 40 - Centre		Wapiti River, d/s WeyCan Haul br.		Wapiti River, RR br. LC	
Sample Date:				2-Oct-89		3-Oct-89		3-Oct-89	
Latitude/Longitude:				55°04'19" 118°48'17"		55°04'06" 118°42'19"		55°04'30" 118°36'57"	
Lab No.:		WG2770-101 L		L2359-1R		L2359-2R		L2359-3R	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2 - MoCB	1	U		U		U			3.1
3 - MoCB	2	U		U		U		U	
4 - MoCB	3	U		R	5.2	U			3.6
2,2' - DiCB	4	U		U		U		U	
2,3 - DiCB	5	U		U		U		U	
2,3' - DiCB	6	U		U		U		U	
2,4 - DiCB	7	U		U		U		U	
2,4' - DiCB	8	U		U		U			8.1
2,5 - DiCB	9	U		U		U		U	
2,6 - DiCB	10	U		U		U		U	
3,3' - DiCB	11	U		U		U		U	
3,4 - DiCB	12	CU		CU		CU		CU	
3,4' - DiCB	13	C12		C12		C12		C12	
3,5 - DiCB	14	U		U		U		U	
4,4' - DiCB	15	U		U		U			7.7
2,2',3 - TriCB	16	U		U		U		U	
2,2',4 - TriCB	17	U		R	0.98	U		U	
2,2',5 - TriCB	18	C	1.1	CR	1.5	C	1.6	CU	
2,2',6 - TriCB	19	U		U		U		U	
2,3,3' - TriCB	20	CU		C	1.8	C	2.6	C	2.8
2,3,4 - TriCB	21	CU		CU		CU		CR	0.97
2,3,4' - TriCB	22	U		U		U		U	
2,3,5 - TriCB	23	U		U		U		U	
2,3,6 - TriCB	24	U		U		U		U	
2,3',4 - TriCB	25	U		U		U		U	
2,3',5 - TriCB	26	CU		CU		CU		CU	
2,3',6 - TriCB	27	U		U		U		U	
2,4,4' - TriCB	28	C20		C20		C20		C20	
2,4,5 - TriCB	29	C26		C26		C26		C26	
2,4,6 - TriCB	30	C18		C18		C18		C18	
2,4',5 - TriCB	31	U		R	1.4		2.3	R	2.3
2,4',6 - TriCB	32	U		U		U		U	
2',3,4 - TriCB	33	C21		C21		C21		C21	
2',3,5 - TriCB	34	U		U		U		U	
3,3',4 - TriCB	35	U		U		U		U	
3,3',5 - TriCB	36	U		U		U		U	
3,4,4' - TriCB	37	U		U		U		U	
3,4,5 - TriCB	38	U		U		U		U	
3,4',5 - TriCB	39	U		U		U		U	
2,2',3,3' - TeCB	40	CU		CU		CU		CU	
2,2',3,4 - TeCB	41	C40		C40		C40		C40	
2,2',3,4' - TeCB	42	U		U		U		U	
2,2',3,5 - TeCB	43	U		U		U		U	
2,2',3,5' - TeCB	44	CR	1.1	C	21	C	1.7	C	5.2
2,2',3,6 - TeCB	45	CU		C	3.3	CU		CU	

		Blank		Wapiti River					
Sample Descripton:		Lab Blank		Wapiti River, at Hwy 40 - Centre		Wapiti River, d/s P&G Haul br.		Wapiti River, RR br. LC	
Sample Date:				2-Oct-89		3-Oct-89		3-Oct-89	
Latitude/Longitude:				55°04'19" 118°48'17"		55°04'06" 118°42'19"		55°04'30" 118°36'57"	
Lab No.:		WG2770-101 L		L2359-1R		L2359-2R		L2359-3R	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3,6' - TeCB	46	U		U		U		U	
2,2',4,4' - TeCB	47	C44		C44		C44		C44	
2,2',4,5 - TeCB	48	U		U		U		U	
2,2',4,5' - TeCB	49	CU		C	1.2	C	1.2	C	1.9
2,2',4,6 - TeCB	50	CU		CU		CU		CU	
2,2',4,6' - TeCB	51	C45		C45		C45		C45	
2,2',5,5' - TeCB	52		0.74		1.4		2.4		5.9
2,2',5,6' - TeCB	53	C50		C50		C50		C50	
2,2',6,6' - TeCB	54	U		U		U		U	
2,3,3',4 - TeCB	55	U		U		U		U	
2,3,3',4' - TeCB	56	U		U		U		U	
2,3,3',5 - TeCB	57	U		U		U		U	
2,3,3',5' - TeCB	58	U		U		U		U	
2,3,3',6 - TeCB	59	CU		CU		CU		CU	
2,3,4,4' - TeCB	60	U		U		U		U	
2,3,4,5 - TeCB	61	CU		C	1.5	C	1.7	C	7.8
2,3,4,6 - TeCB	62	C59		C59		C59		C59	
2,3,4',5 - TeCB	63	U		U		U		U	
2,3,4',6 - TeCB	64	U		U			0.55	R	0.89
2,3,5,6 - TeCB	65	C44		C44		C44		C44	
2,3',4,4' - TeCB	66	U		R	0.90		1.4		3.0
2,3',4,5 - TeCB	67	U		U		U		U	
2,3',4,5' - TeCB	68	U			4.8	U		U	
2,3',4,6 - TeCB	69	C49		C49		C49		C49	
2,3',4',5 - TeCB	70	C61		C61		C61		C61	
2,3',4',6 - TeCB	71	C40		C40		C40		C40	
2,3',5,5' - TeCB	72	U		U		U		U	
2,3',5',6 - TeCB	73	U		U		U		U	
2,4,4',5 - TeCB	74	C61		C61		C61		C61	
2,4,4',6 - TeCB	75	C59		C59		C59		C59	
2',3,4,5 - TeCB	76	C61		C61		C61		C61	
3,3',4,4' - TeCB	77	U		U		U		U	
3,3',4,5 - TeCB	78	U		U		U		U	
3,3',4,5' - TeCB	79	U		U		U		U	
3,3',5,5' - TeCB	80	U		U		U		U	
3,4,4',5 - TeCB	81	U		U		U		U	
2,2',3,3',4 - PeCB	82	U		U		U		R	1.2
2,2',3,3',5 - PeCB	83	CU		CR	0.56	CR	0.92	CR	5.9
2,2',3,3',6 - PeCB	84	U		U		R	0.81	U	
2,2',3,4,4' - PeCB	85	CU		CU		CU		CR	2.6
2,2',3,4,5 - PeCB	86	CU		CU		CR	0.86	CR	8.5
2,2',3,4,5' - PeCB	87	C86		C86		C86		C86	
2,2',3,4,6 - PeCB	88	CU		CU		CU		CR	2.3
2,2',3,4,6' - PeCB	89	U		U		U		U	
2,2',3,4',5 - PeCB	90	CU		C	1.0	CR	2.0	C	10
2,2',3,4',6 - PeCB	91	C88		C88		C88		C88	
2,2',3,5,5' - PeCB	92	U		U		U		R	2.1
2,2',3,5,6 - PeCB	93	CU		CU		CU		C	8.2

		Blank		Wapiti River					
Sample Descripton:		Lab Blank		Wapiti River, at Hwy 40 - Centre		Wapiti River, d/s P&G Haul br.		Wapiti River, RR br. LC	
Sample Date:				2-Oct-89		3-Oct-89		3-Oct-89	
Latitude/Longitude:				55°04'19" 118°48'17"		55°04'06" 118°42'19"		55°04'30" 118°36'57"	
Lab No.:		WG2770-101 L		L2359-1R		L2359-2R		L2359-3R	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3,5,6' - PeCB	94	U		U		U		U	
2,2',3,5',6 - PeCB	95	C93		C93		C93		C93	
2,2',3,6,6' - PeCB	96	U		U		U		U	
2,2',3',4,5 - PeCB	97	C86		C86		C86		C86	
2,2',3',4,6 - PeCB	98	C93		C93		C93		C93	
2,2',4,4',5 - PeCB	99	C83		C83		C83		C83	
2,2',4,4',6 - PeCB	100	C93		C93		C93		C93	
2,2',4,5,5' - PeCB	101	C90		C90		C90		C90	
2,2',4,5,6' - PeCB	102	C93		C93		C93		C93	
2,2',4,5',6 - PeCB	103	U		U		U		U	
2,2',4,6,6' - PeCB	104	U		U		U		U	
2,3,3',4,4' - PeCB	105	U		U		U		R	4.2
2,3,3',4,5 - PeCB	106	U		U		U		U	
2,3,3',4',5 - PeCB	107	CU		CU		CU		CU	
2,3,3',4,5' - PeCB	108	C86		C86		C86		C86	
2,3,3',4,6 - PeCB	109	U		U		U		U	
2,3,3',4',6 - PeCB	110	CR	0.57	CR	0.80	C	1.6	CR	10
2,3,3',5,5' - PeCB	111	U		U		U		U	
2,3,3',5,6 - PeCB	112	U		U		U		U	
2,3,3',5',6 - PeCB	113	C90		C90		C90		C90	
2,3,4,4',5 - PeCB	114	U		U		U		U	
2,3,4,4',6 - PeCB	115	C110		C110		C110		C110	
2,3,4,5,6 - PeCB	116	C85		C85		C85		C85	
2,3,4',5,6 - PeCB	117	C85		C85		C85		C85	
2,3',4,4',5 - PeCB	118	R	0.84	R	0.57		1.4		11
2,3',4,4',6 - PeCB	119	C86		C86		C86		C86	
2,3',4,5,5' - PeCB	120	U		U		U		U	
2,3',4,5',6 - PeCB	121	U		U		U		U	
2',3,3',4,5 - PeCB	122	U		U		U		U	
2',3,4,4',5 - PeCB	123	U		U		U		U	
2',3,4,5,5' - PeCB	124	C107		C107		C107		C107	
2',3,4,5,6' - PeCB	125	C86		C86		C86		C86	
3,3',4,4',5 - PeCB	126	U		U		U		U	
3,3',4,5,5' - PeCB	127	U		U		U		U	
2,2',3,3',4,4' - HxCB	128	CU		CU		CU		CR	0.84
2,2',3,3',4,5 - HxCB	129	CR	0.96	CU		CR	1.1	C	6.0
2,2',3,3',4,5' - HxCB	130	U		U		U		U	
2,2',3,3',4,6 - HxCB	131	U		U		U		U	
2,2',3,3',4,6' - HxCB	132	U		U		U		U	
2,2',3,3',5,5' - HxCB	133	U		U		U		U	
2,2',3,3',5,6 - HxCB	134	CU		CU		CU		CU	
2,2',3,3',5,6' - HxCB	135	CU		CU		C	0.39	CR	0.77
2,2',3,3',6,6' - HxCB	136	U		U		U		R	1.3
2,2',3,4,4',5 - HxCB	137	U		U		U		R	0.71
2,2',3,4,4',5' - HxCB	138	C129		C129		C129		C129	
2,2',3,4,4',6 - HxCB	139	CU		CU		CU		CU	
2,2',3,4,4',6' - HxCB	140	C139		C139		C139		C139	
2,2',3,4,5,5' - HxCB	141	U		U		U		U	

		Blank		Wapiti River					
Sample Descripton:		Lab Blank		Wapiti River, at Hwy 40 - Centre		Wapiti River, d/s P&G Haul br.		Wapiti River, RR br. LC	
Sample Date:				2-Oct-89		3-Oct-89		3-Oct-89	
Latitude/Longitude:				55°04'19" 118°48'17"		55°04'06" 118°42'19"		55°04'30" 118°36'57"	
Lab No.:		WG2770-101 L		L2359-1R		L2359-2R		L2359-3R	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3,4,5,6 - HxCB	142	U		R	0.58	U		U	
2,2',3,4,5,6' - HxCB	143	C134		C134		C134		C134	
2,2',3,4,5',6 - HxCB	144	U		U		U		U	
2,2',3,4,6,6' - HxCB	145	U		U		R	0.28	U	
2,2',3,4',5,5' - HxCB	146	U		U		U		U	
2,2',3,4',5,6 - HxCB	147	CR	0.47	CR	1.0	CR	1.7	CR	5.3
2,2',3,4',5,6' - HxCB	148	U		U		U		U	
2,2',3,4',5',6 - HxCB	149	C147		C147		C147		C147	
2,2',3,4',6,6' - HxCB	150	U		U		U		U	
2,2',3,5,5',6 - HxCB	151	C135		C135		C135		C135	
2,2',3,5,6,6' - HxCB	152	U		U		U		U	
2,2',4,4',5,5' - HxCB	153	C	0.94	CR	0.40	C	1.5	C	4.8
2,2',4,4',5,6' - HxCB	154	C135		C135		C135		C135	
2,2',4,4',6,6' - HxCB	155	U		U		U		R	0.34
2,3,3',4,4',5 - HxCB	156	CU		CR	0.53	CU		CU	
2,3,3',4,4',5' - HxCB	157	C156		C156		C156		C156	
2,3,3',4,4',6 - HxCB	158	U		U		U		R	0.96
2,3,3',4,5,5' - HxCB	159	U		U		U		U	
2,3,3',4,5,6 - HxCB	160	C129		C129		C129		C129	
2,3,3',4,5',6 - HxCB	161	U		U		U		U	
2,3,3',4',5,5' - HxCB	162	U		U		U		U	
2,3,3',4',5,6 - HxCB	163	C129		C129		C129		C129	
2,3,3',4',5',6 - HxCB	164	U		U		U		U	
2,3,3',5,5',6 - HxCB	165	U		U		U		U	
2,3,4,4',5,6 - HxCB	166	C128		C128		C128		C128	
2,3',4,4',5,5' - HxCB	167	U		U		U		U	
2,3',4,4',5',6 - HxCB	168	C153		C153		C153		C153	
3,3',4,4',5,5' - HxCB	169	U		U		U		U	
2,2',3,3',4,4',5 - HpCB	170	U		U		U		U	
2,2',3,3',4,4',6 - HpCB	171	CU		CU		CU		CU	
2,2',3,3',4,5,5' - HpCB	172	U		U		U		U	
2,2',3,3',4,5,6 - HpCB	173	C171		C171		C171		C171	
2,2',3,3',4,5,6' - HpCB	174	U		U		U		U	
2,2',3,3',4,5',6 - HpCB	175	U			2.7	U		U	
2,2',3,3',4,6,6' - HpCB	176	U		U		U		U	
2,2',3,3',4',5,6 - HpCB	177	U		U		U		U	
2,2',3,3',5,5',6 - HpCB	178	U		U		U		U	
2,2',3,3',5,6,6' - HpCB	179	U		U		U		U	
2,2',3,4,4',5,5' - HpCB	180	CU		CR	1.2	CR	1.3	CR	1.5
2,2',3,4,4,'5,6 - HpCB	181	U		U		U		U	
2,2',3,4,4',5,6' - HpCB	182	U		U		U		U	
2,2',3,4,4',5',6 - HpCB	183	CU		CU		CU		CR	0.76
2,2',3,4,4',6,6' - HpCB	184	U		U		U		U	
2,2',3,4,5,5',6 - HpCB	185	C183		C183		C183		C183	
2,2',3,4,5,6,6' - HpCB	186	U		U		U		U	
2,2',3,4',5,5',6 - HpCB	187	U		U		R	0.63	U	
2,2',3,4',5,6,6' - HpCB	188	U		U		U		U	
2,3,3',4,4',5,5' - HpCB	189	U		U		U		U	

		Blank		Wapiti River					
Sample Descripton:		Lab Blank		Wapiti River, at Hwy 40 - Centre		Wapiti River, d/s P&G Haul br.		Wapiti River, RR br. LC	
Sample Date:				2-Oct-89		3-Oct-89		3-Oct-89	
Latitude/Longitude:				55°04'19" 118°48'17"		55°04'06" 118°42'19"		55°04'30" 118°36'57"	
Lab No.:		WG2770-101 L		L2359-1R		L2359-2R		L2359-3R	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,3,3',4,4',5,6 - HpCB	190	U		U		U		U	
2,3,3',4,4',5',6 - HpCB	191	U		U		U		U	
2,3,3',4,5,5',6 - HpCB	192	U		U		U		U	
2,3,3',4',5,5',6 - HpCB	193	C180		C180		C180		C180	
2,2',3,3',4,4',5,5' - OcCB	194	U		U		U		U	
2,2',3,3',4,4',5,6 - OcCB	195	U		U		U		U	
2,2',3,3',4,4',5,6' - OcCB	196	U		U		U		U	
2,2',3,3',4,4',6,6' - OcCB	197	CU		CU		CU		CU	
2,2',3,3',4,5,5',6 - OcCB	198	CU		CU		CU		CU	
2,2',3,3',4,5,5',6' - OcCB	199	C198		C198		C198		C198	
2,2',3,3',4,5,6,6' - OcCB	200	C197		C197		C197		C197	
2,2',3,3',4,5',6,6' - OcCB	201	U		U		U		U	
2,2',3,3',5,5',6,6' - OcCB	202	U		U		U		U	
2,2',3,4,4',5,5',6 - OcCB	203	U		U		U		U	
2,2',3,4,4',5,6,6' - OcCB	204	U		R	0.85	U		U	
2,3,3',4,4',5,5',6 - OcCB	205	U		U		U		U	
2,2',3,3',4,4',5,5',6 - NoCB	206	U		U		U		U	
2,2',3,3',4,4',5,6,6' - NoCB	207	U		U		U		U	
2,2',3,3',4,5,5',6,6' - NoCB	208	U		U		U		U	
2,2',3,3',4,4',5,5',6,6' - DeCB	209	R	0.83	U		U		U	
ΣPCBs[1]			2.78		38.7		20.34		89.1

[1]Excludes R flagged values

[2]Concentrations as pg/g dry wt.

Flag: U = Not Detected; R = Peak detected but not confirmed by ratio; C = Coelutes with

Analysis by Axys Analytical Services Ltd., Jan-Mar 2000

	Wapiti River									
	Wapiti River, u/s of Bear River 4-Oct-89 55°06'24" 118°28'14" L2359-5R		Wapiti River, 10 km d/s WeyCan Effl., LB 3-Oct-89 55°04'50" 118°32'10" L2359-4R		Lab Blank WG2873-101		Wapiti River, 10 km u/s Mouth 4-Oct-89 55°07'19" 118°24'04" L2359-6R2		Wapiti River, 0.5 km u/s Mouth 4-Oct-89 55°08'06" 118°18'30" L2359-7R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1		2.4	R	2.8	U			5.7	R	4.7
2	U		U		U		U		U	
3	R	1.2	R	2.1	U		R	1.8		3.5
4	U		U		U			4.5	U	
5	U		U		U		U		U	
6	U		U		U		U		U	
7	U		U		U		U		U	
8		9.9		7.0	U			17		11
9	U		U		U		U		U	
10	U		U		U		U		U	
11	U		U		U		U		U	
12	CU		CU		CU		CU		CU	
13	C12		C12		C12		C12		C12	
14	U		U		U		U		U	
15		9.6		7.2	U			12		14
16	U		U		U		R	1.1	U	
17	U		U		U			0.69	U	
18	CU		CR	1.2	CR	0.51	C	1.4	C	2.5
19	U		U		U		U		U	
20	C	2.1	C	2.1	CU		C	3.3	C	4.4
21	CU		CU		CU		C	1.5	C	1.3
22	U		U		U			0.88	U	
23	U		U		U		U		U	
24	U		U		U		U		U	
25	U		U		U		U		U	
26	CU		CU		CU		CU		CU	
27	U		U		U		U		U	
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		1.3	R	1.8	U			1.8	R	3.5
32	U		U		U		R	0.55	U	
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35	U		U		U		U		U	
36	U		U		U		U		U	
37	U		U		U		U		U	
38	U		U		U		U		U	
39	U		U		U		U		U	
40	CU		CU		CR	0.57	C	0.95	CU	
41	C40		C40		C40		C40		C40	
42	U		U		U		R	0.38	U	
43	U		U		U		U		U	
44	C	1.8	CR	2.6	CR	0.70	C	3.4	CR	8.1
45	CU		CU		CU		CU		CU	

	Wapiti River									
	Wapiti River, u/s of Bear River 4-Oct-89 55°06'24" 118°28'14" L2359-5R		Wapiti River, 10 km d/s P&G Effl., LB 3-Oct-89 55°04'50" 118°32'10" L2359-4R		Lab Blank WG2873-101		Wapiti River, 10 km u/s Mouth 4-Oct-89 55°07'19" 118°24'04" L2359-6R2		Wapiti River, 0.5 km u/s Mouth 4-Oct-89 55°08'06" 118°18'30" L2359-7R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
46	U		U		U		U		U	
47	C44		C44		C44		C44		C44	
48	U		U		U		U		U	
49	CR	0.78	CR	1.8	CU		C	1.4	CR	1.6
50	CU		CU		CU		CU		CU	
51	C45		C45		C45		C45		C45	
52	R	3.1	R	3.5	U			4.1		6.9
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56	U		U		U		R	1.1		1.2
57	U		U		U		U		U	
58	U		U		U		U		U	
59	CU		CU		CU		C	0.26	CU	
60	U		U		U		U		R	0.95
61	C	3.2	C	4.7	CU		C	4.9	C	9.8
62	C59		C59		C59		C59		C59	
63	U		U		U		U		U	
64	R	0.55	R	0.93	U			0.87	R	1.7
65	C44		C44		C44		C44		C44	
66	R	1.4		2.3	U			2.3		3.7
67	U		U		U		U		U	
68	U		U		U		U		R	1.2
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77	U		U		U		U		U	
78	U		U		U		U		U	
79	U		U		U		U		U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82	U		U		U		U			1.8
83	C	4.6	C	3.2	CU		CR	4.1	C	6.8
84		2.3	R	1.6	U			2.4	R	5.0
85	CR	0.87	CR	1.2	CU		CU		C	2.9
86	C	5.5	CR	4.1	CU		C	5.0	C	11
87	C86		C86		C86		C86		C86	
88	CR	0.50	CR	0.80	CU		CR	0.94	CR	1.5
89	U		U		U		U		U	
90	C	7.6	CR	6.3	CU		C	7.1	C	15
91	C88		C88		C88		C88		C88	
92		1.2		1.5	U			1.1	R	1.8
93	CR	7.2	CR	4.5	CU		CU		C	10

	Wapiti River									
	Wapiti River, u/s of Bear River 4-Oct-89 55°06'24" 118°28'14" L2359-5R		Wapiti River, 10 km d/s P&G Effl., LB 3-Oct-89 55°04'50" 118°32'10" L2359-4R		Lab Blank WG2873-101		Wapiti River, 10 km u/s Mouth 4-Oct-89 55°07'19" 118°24'04" L2359-6R2		Wapiti River, 0.5 km u/s Mouth 4-Oct-89 55°08'06" 118°18'30" L2359-7R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
94	U		U		U		U		U	
95	C93		C93		C93		C93		C93	
96	U		U		U		U		U	
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93	
103	U		U		U		U		U	
104	U		U		U		U		U	
105	R	3.3		2.1	U		R	2.7		6.3
106	U		U		U		U		U	
107	CU		CU		CU		CU		CU	
108	C86		C86		C86		C86		C86	
109	R	0.66	R	0.75	U		U		R	1.5
110	C	7.7	C	5.6	CU		C	7.2	C	16
111	U		U		U		U		U	
112	U		U		U		U		U	
113	C90		C90		C90		C90		C90	
114	U		U		U		U		U	
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		7.6		6.9	R	0.91		7.4		15
119	C86		C86		C86		C86		C86	
120	U		U		U		U		U	
121	U		U		U		U		U	
122	U		U		U		U		U	
123	U		U		U		U		R	0.92
124	C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86	
126	U		U		U		U		U	
127	U		U		U		U		U	
128	CR	1.2	CR	0.82	CU		CU		C	2.9
129	CR	6.5	C	4.9	CR	1.1	C	8.8	C	15
130	R	0.94	U		U		U			0.83
131	U		U		U		U		U	
132		2.5	R	1.1	U		R	2.4	R	4.7
133	U		U		U		U		U	
134	CU		CU		CU		CU		CR	0.80
135	C	0.47	CR	1.0	CU		CR	3.1	CR	3.4
136	R	0.64	R	0.63	U			1.0		1.8
137	U		U		U		U		U	
138	C129		C129		C129		C129		C129	
139	CU		CU		CU		CU		CU	
140	C139		C139		C139		C139		C139	
141	R	1.2	U		U		R	1.4	R	2.1

	Wapiti River									
	Wapiti River, u/s of Bear River 4-Oct-89 55°06'24" 118°28'14" L2359-5R		Wapiti River, 10 km d/s P&G Effl., LB 3-Oct-89 55°04'50" 118°32'10" L2359-4R		Lab Blank WG2873-101		Wapiti River, 10 km u/s Mouth 4-Oct-89 55°07'19" 118°24'04" L2359-6R2		Wapiti River, 0.5 km u/s Mouth 4-Oct-89 55°08'06" 118°18'30" L2359-7R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
142	U		U		U		U		U	
143	C134		C134		C134		C134		C134	
144	R	0.45	U		U		U		R	0.82
145	U		U		U		U		U	
146	R	1.2	R	0.59	U		U			2.2
147	C	3.4	CR	1.9	CU		CR	4.6	CR	10
148	U		U		U		U		U	
149	C147		C147		C147		C147		C147	
150	U		U		U		U		U	
151	C135		C135		C135		C135		C135	
152	U		U		U		U		U	
153	CR	4.6	C	4.2	CR	1.5	CR	6.6	CR	11
154	C135		C135		C135		C135		C135	
155	U		U		U		U		U	
156	CR	1.1	CU		CU		CU		C	2.9
157	C156		C156		C156		C156		C156	
158	R	1.1	R	0.58	U		U		R	1.3
159	U		U		U		U		U	
160	C129		C129		C129		C129		C129	
161	U		U		U		U		U	
162	U		U		U		U		U	
163	C129		C129		C129		C129		C129	
164	R	0.49	U		U		U			1.2
165	U		U		U		U		U	
166	C128		C128		C128		C128		C128	
167	U		R	0.48	U		U		R	0.86
168	C153		C153		C153		C153		C153	
169	U		U		U		U		U	
170	U		R	1.1	U		R	1.7	R	3.1
171	CU		CU		CU		CU		CU	
172	U		U		U		U		U	
173	C171		C171		C171		C171		C171	
174	U		R	0.69	U			1.3	R	1.1
175	U		U		U		U		U	
176	U		U		U		U		U	
177	U		U		U		R	0.91	U	
178	U		U		U		U		U	
179	R	0.54	U		U		U			1.2
180	CR	1.6	C	3.0	C	1.3	CR	3.4	CR	6.7
181	U		U		U		U		U	
182	U		U		U		U		U	
183	CU		C	0.61	CU		C	0.84	CR	1.2
184	U		U		U		U		U	
185	C183		C183		C183		C183		C183	
186	U		U		U		U		U	
187	R	0.68	R	1.4	U			1.9	R	3.5
188	U		U		U		U		U	
189	U		U		U		U		U	

	Wapiti River									
	Wapiti River, u/s of Bear River 4-Oct-89 55°06'24" 118°28'14" L2359-5R		Wapiti River, 10 km d/s P&G Effl., LB 3-Oct-89 55°04'50" 118°32'10" L2359-4R		Lab Blank WG2873-101		Wapiti River, 10 km u/s Mouth 4-Oct-89 55°07'19" 118°24'04" L2359-6R2		Wapiti River, 0.5 km u/s Mouth 4-Oct-89 55°08'06" 118°18'30" L2359-7R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
190	U		U		U		R	0.46	R	0.80
191	U		U		U		U		U	
192	U		U		U		R	0.76	U	
193	C180		C180		C180		C180		C180	
194	U		R	0.81		0.55	R	1.4	U	
195	U		U		U		R	0.44	U	
196	U		U		U		R	0.41	U	
197	CU		CU		CU		CU		CU	
198	CU		C	0.58	CU		C	1.1	CU	
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201	U		U		U		R	0.27	U	
202	U		R	0.52	U		U		U	
203	U			0.78	U		U		R	0.77
204	U		R	0.80	R	0.20	R	0.78	R	1.8
205	U		U		U		U		U	
206	U		U		R	0.38	U		U	
207	U		U		U		U		U	
208	U		U		U		U		U	
209	U		U		R	0.27	R	0.27	U	
ΣPCBs[1]		73.17		56.67		1.85		112.09		171.13

	Wapiti River					
	Wapiti River, d/s RR br. 7-Aug-92 55°04'30" 118°36'57" L2359-8R		Wapiti River, u/s Bear River 7-Aug-92 55°06'24" 118°28'14" L2359-9R		Wapiti River, at the Mouth 7-Aug-92 55°08'06" 118°18'30" L2359-10R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1	R	2.7		2.2		2.3
2	U		U		U	
3		2.2	R	1.9		2.2
4	U		U		U	
5	U		U		U	
6	U		U		U	
7	U		U		U	
8	R	7.7	U		U	
9	U		U		U	
10	U		U		U	
11	U		U		U	
12	CU		CU		CU	
13	C12		C12		C12	
14	U		U		U	
15		7.3	U			5.8
16	U		U		U	
17	U		U		U	
18	CR	2.7	C	1.9	C	2.7
19	U		U		U	
20	C	5.8	CR	4.0	C	3.6
21	CR	2.6	C	1.1	C	1.0
22	R	1.4	R	1.5	R	1.3
23	U		U		U	
24	U		U		U	
25	U		U		U	
26	CU		CU		CU	
27	U		U		U	
28	C20		C20		C20	
29	C26		C26		C26	
30	C18		C18		C18	
31		4.9	R	2.9	R	3.8
32	R	1.1	U		R	0.84
33	C21		C21		C21	
34	U		U		U	
35	U		U		U	
36	U		U		U	
37	U		U		U	
38	U		U		U	
39	U		U		U	
40	CR	2.8	CU		CR	1.6
41	C40		C40		C40	
42	R	1.3	U			0.87
43	U		U		U	
44	C	6.3	CR	3.9	C	6.3
45	CU		CU		CU	

	Wapiti River					
	Wapiti River, d/s RR br. 7-Aug-92 55°04'30" 118°36'57" L2359-8R		Wapiti River, u/s Bear River 7-Aug-92 55°06'24" 118°28'14" L2359-9R		Wapiti River, at the Mouth 7-Aug-92 55°08'06" 118°18'30" L2359-10R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
46	U		U		U	
47	C44		C44		C44	
48	U		U		R	0.83
49	C	3.6	CR	2.1	C	4.8
50	CU		CU		CU	
51	C45		C45		C45	
52		11	R	6.8	R	9.9
53	C50		C50		C50	
54	U		U		U	
55	U		U		U	
56	R	1.4		1.2	R	3.0
57	U		U		U	
58	U		U		U	
59	CU		CU		CU	
60	U		R	1.3	R	1.1
61	C	18	C	13	C	20
62	C59		C59		C59	
63	U		U		U	
64	R	2.6		1.5		2.4
65	C44		C44		C44	
66		5.4		4.2	R	5.5
67	U		U		U	
68	U		U		U	
69	C49		C49		C49	
70	C61		C61		C61	
71	C40		C40		C40	
72	U		U		U	
73	U		U		U	
74	C61		C61		C61	
75	C59		C59		C59	
76	C61		C61		C61	
77	U		U		U	
78	U		U		U	
79	U		U		U	
80	U		U		U	
81	U		U		U	
82	R	2.1	R	2.8	R	3.0
83	C	12	C	9.7	C	16
84	R	5.9	R	4.7		7.9
85	C	4.0	CR	2.0	C	4.4
86	C	15	CR	13	C	23
87	C86		C86		C86	
88	CR	2.1	CU		CR	3.8
89	U		U		U	
90	C	21	C	16	C	25
91	C88		C88		C88	
92		4.6		2.3		4.3
93	CR	13	C	12	C	18

	Wapiti River					
	Wapiti River, d/s RR br. 7-Aug-92 55°04'30" 118°36'57" L2359-8R		Wapiti River, u/s Bear River 7-Aug-92 55°06'24" 118°28'14" L2359-9R		Wapiti River, at the Mouth 7-Aug-92 55°08'06" 118°18'30" L2359-10R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
94	U		U		U	
95	C93		C93		C93	
96	U		U		U	
97	C86		C86		C86	
98	C93		C93		C93	
99	C83		C83		C83	
100	C93		C93		C93	
101	C90		C90		C90	
102	C93		C93		C93	
103	U		U		U	
104	U		U		U	
105		11		10		14
106	U		U		U	
107	CU		CU		CR	1.4
108	C86		C86		C86	
109	R	1.6	R	2.0		2.1
110	C	21	C	21	C	27
111	U		U		U	
112	U			0.49	R	0.82
113	C90		C90		C90	
114	U		U		R	0.71
115	C110		C110		C110	
116	C85		C85		C85	
117	C85		C85		C85	
118		27		23		34
119	C86		C86		C86	
120	U		U		U	
121	U		U		U	
122	U		U		U	
123	U		R	1.4		0.88
124	C107		C107		C107	
125	C86		C86		C86	
126	U		U		U	
127	U		U		U	
128	C	3.7	C	4.0	C	5.3
129	C	18	C	16	C	26
130	R	1.9	U		U	
131	U		U		U	
132	U			4.7	R	8.2
133	U		R	1.3	U	
134	CR	1.1	CU		CU	
135	CR	2.9	CR	3.3	C	6.0
136	U		U		U	
137		2.0	U		R	2.3
138	C129		C129		C129	
139	CU		CU		CU	
140	C139		C139		C139	
141	R	2.5	R	3.6	R	5.5

	Wapiti River					
	Wapiti River, d/s RR br. 7-Aug-92 55°04'30" 118°36'57" L2359-8R		Wapiti River, u/s Bear River 7-Aug-92 55°06'24" 118°28'14" L2359-9R		Wapiti River, at the Mouth 7-Aug-92 55°08'06" 118°18'30" L2359-10R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
142	U		U		U	
143	C134		C134		C134	
144	U		R	0.80	R	1.5
145	U		U		U	
146	R	1.7	R	1.5	R	1.9
147	CR	10	C	7.4	C	13
148	U		U		U	
149	C147		C147		C147	
150	U		U		U	
151	C135		C135		C135	
152	U		U		U	
153	C	11	C	10	C	16
154	C135		C135		C135	
155	U		U		U	
156	CR	2.9	CR	1.9	CR	3.6
157	C156		C156		C156	
158	R	2.2	R	1.6	R	2.8
159	U		U		U	
160	C129		C129		C129	
161	U		U		U	
162	U		U		U	
163	C129		C129		C129	
164	R	1.1	U		R	1.3
165	U		U		U	
166	C128		C128		C128	
167	R	0.71	R	1.3	R	0.85
168	C153		C153		C153	
169	U		U		U	
170	R	2.2	R	1.4	R	2.5
171	C	1.0	CR	1.1	CU	
172	U		U		U	
173	C171		C171		C171	
174	U		R	0.83	U	
175	U		U		U	
176	U		U		U	
177	U		R	1.1	R	1.7
178	U		U		U	
179	U		R	0.51	R	1.4
180	CR	2.4	CR	5.1	CR	4.3
181	U		U		U	
182	U		U		U	
183	CU		CR	0.77	CU	
184	U		U		U	
185	C183		C183		C183	
186	U		U		U	
187	R	2.0	R	1.3	R	1.9
188	U		U		U	
189	U		U		U	

	Wapiti River					
	Wapiti River, d/s RR br. 7-Aug-92 55°04'30" 118°36'57" L2359-8R		Wapiti River, u/s Bear River 7-Aug-92 55°06'24" 118°28'14" L2359-9R		Wapiti River, at the Mouth 7-Aug-92 55°08'06" 118°18'30" L2359-10R	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
190	U		U		U	
191	U		U		U	
192	U		U		U	
193	C180		C180		C180	
194	U		U		R	0.86
195	U		U		U	
196	U		U		U	
197	CU		CU		CU	
198	CU		CU		CU	
199	C198		C198		C198	
200	C197		C197		C197	
201	U		U		U	
202	U		U		U	
203	U		U		U	
204	R	0.84	R	0.87		0.81
205	U		U		U	
206	U		U		U	
207	U		U		U	
208	U		U		U	
209	U		U		R	0.85
ΣPCBs[1]		215.8		161.69		295.66

Appendix A5 Athabasca River and tributaries 2000 samples: sediment PCB data

		Blank		Athabasca River				Happy Creek	
Sample Description:		Lab Blank (QA)		Atha. R., at Brule Lake near Mouth, Site 2		Atha R., u/s Maskuta Creek, Site 2		Happy Creek near Mouth	
Sample Date:		N/A		11-Oct-2000		11-Oct-2000		11-Oct-2000	
Latitude/Longitude:				53°19'45" 117°5015"		53°22'52" 117°39'51"		53°24'00" 117°36'15"	
Lab No.:		WG3934-101		L3042-1 i		L3042-3 i		L3042-5 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2 - MoCB	1		52.9		1.44		1.37		0.772
3 - MoCB	2		44.4		0.713		0.708		0.322
4 - MoCB	3		116		1.03		0.944		0.58
2,2' - DiCB	4		42.3		1.07		0.753		0.59
2,3 - DiCB	5	U		U		U		U	
2,3' - DiCB	6	U			0.417		0.363		0.309
2,4 - DiCB	7	U		U		U		U	
2,4' - DiCB	8		52.5		2.1		1.64		1.33
2,5 - DiCB	9	U		U		U		U	
2,6 - DiCB	10	U		U		U		U	
3,3' - DiCB	11		45.2		2.66		1.63		5.45
3,4 - DiCB	12	C U		C	0.705	C	0.642	C	0.342
3,4' - DiCB	13	C12		C12		C12		C12	
3,5 - DiCB	14	U		U		U		U	
4,4' - DiCB	15		69.7		1.36		0.874		1.32
2,2',3 - TriCB	16	R	14.8		1		0.637		0.631
2,2',4 - TriCB	17		21.4		1.1		0.728		0.783
2,2',5 - TriCB	18	C	35.1	C	2.36	C	1.57	C	1.51
2,2',6 - TriCB	19	U			0.281		0.176		0.219
2,3,3' - TriCB	20	C	63	C	3.7	C	2.16	C	2.75
2,3,4 - TriCB	21	C R	19.1	C	1.51	C	1.09	C	1.37
2,3,4' - TriCB	22		14.7		1.25		0.764		0.935
2,3,5 - TriCB	23	U		U		U		U	
2,3,6 - TriCB	24	U		U		U		U	
2,3',4 - TriCB	25	U		R	0.178	R	0.142		0.185
2,3',5 - TriCB	26	C	12.2	C	0.583	C	0.369	C	0.373
2,3',6 - TriCB	27	U			0.187	R	0.103		0.14
2,4,4' - TriCB	28	C20		C20		C20		C20	
2,4,5 - TriCB	29	C26		C26		C26		C26	
2,4,6 - TriCB	30	C18		C18		C18		C18	
2,4',5 - TriCB	31		50.4		3.29		2.01		2.07
2,4',6 - TriCB	32	R	11.6		0.705		0.44		0.534
2',3,4 - TriCB	33	C21		C21		C21		C21	
2',3,5 - TriCB	34	U		U		U		U	
3,3',4 - TriCB	35	U			0.114		0.101		0.174
3,3',5 - TriCB	36	U		U		U		U	
3,4,4' - TriCB	37	U			0.948		0.504		0.938
3,4,5 - TriCB	38	U			0.757		0.696		0.115
3,4',5 - TriCB	39	U		U		U		U	
2,2',3,3' - TeCB	40	C R	13.8	C	1.74	C	0.957	C	1.21
2,2',3,4 - TeCB	41	C40		C40		C40		C40	
2,2',3,4' - TeCB	42	U			0.803		0.484		0.533
2,2',3,5 - TeCB	43	U		U		U		U	
2,2',3,5' - TeCB	44	C	567	C	5.5	C	2.92	C	2.66
2,2',3,6 - TeCB	45	C	77.3	C	0.537	C	0.355	C	0.533
2,2',3,6' - TeCB	46	U		U		U		R	0.261
2,2',4,4' - TeCB	47	C44		C44		C44		C44	
2,2',4,5 - TeCB	48	U			0.551		0.243		0.409

Sample Description:		Blank		Athabasca River				Happy Creek	
		Lab Blank (QA)		Atha. R., at Brule Lake near Mouth		Atha R., u/s Maskuta Creek		Happy Creek near Mouth	
Sample Date:		N/A		15-Dec-2000		15-Dec-2000		15-Dec-2000	
Latitude/Longitude:				53°19'45" 117°5015"		53°22'52" 117°39'51"		53°24'00" 117°36'15"	
Lab No.:		WG3934-101		L3042-1 i		L3042-3 i		L3042-5 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',4,5' - TeCB	49	C	36.5	C	3.05	C	1.65	C	1.33
2,2',4,6 - TeCB	50	C U		C	0.438	C	0.284	C	0.407
2,2',4,6' - TeCB	51	C45		C45		C45		C45	
2,2',5,5' - TeCB	52		48.3		10.5		5.18		3.96
2,2',5,6' - TeCB	53	C50		C50		C50		C50	
2,2',6,6' - TeCB	54	U		U		U		U	
2,3,3',4 - TeCB	55	U		U		U		U	
2,3,3',4' - TeCB	56	U			1.78		0.889		0.94
2,3,3',5 - TeCB	57	U		U		U		U	
2,3,3',5' - TeCB	58	U		U		U		U	
2,3,3',6 - TeCB	59	C U		C	0.292	C	0.182	C	0.216
2,3,4,4' - TeCB	60	U			0.892		0.52	R	0.52
2,3,4,5 - TeCB	61	C R	31	C	11.6	C	5.24	C	4.45
2,3,4,6 - TeCB	62	C59		C59		C59		C59	
2,3,4',5 - TeCB	63	U			0.137	U		U	
2,3,4',6 - TeCB	64		12.2		2.1		1.01		1.07
2,3,5,6 - TeCB	65	C44		C44		C44		C44	
2,3',4,4' - TeCB	66		30		4.02		1.94	R	1.87
2,3',4,5 - TeCB	67	U		U		U		U	
2,3',4,5' - TeCB	68		93.6	U		U			0.124
2,3',4,6 - TeCB	69	C49		C49		C49		C49	
2,3',4',5 - TeCB	70	C61		C61		C61		C61	
2,3',4',6 - TeCB	71	C40		C40		C40		C40	
2,3',5,5' - TeCB	72	U		U		U		U	
2,3',5',6 - TeCB	73	U		U		U		U	
2,4,4',5 - TeCB	74	C61		C61		C61		C61	
2,4,4',6 - TeCB	75	C59		C59		C59		C59	
2',3,4,5 - TeCB	76	C61		C61		C61		C61	
3,3',4,4' - TeCB	77	U			0.604		0.328		0.549
3,3',4,5 - TeCB	78	U		U		U		U	
3,3',4,5' - TeCB	79	U			0.19	U		U	
3,3',5,5' - TeCB	80	U		U		U		U	
3,4,4',5 - TeCB	81	U		U		U		U	
2,2',3,3',4 - PeCB	82	U			2.08		0.852		0.962
2,2',3,3',5 - PeCB	83	C	25.1	C	10.7	C	4.46	C	4.69
2,2',3,3',6 - PeCB	84	U			4.37		2.08		2.96
2,2',3,4,4' - PeCB	85	C U		C	2.51	C	1.26	C	0.947
2,2',3,4,5 - PeCB	86	C R	16.5	C	12.4	C	5.74	C	7.52
2,2',3,4,5' - PeCB	87	C86		C86		C86		C86	
2,2',3,4,6 - PeCB	88	C U		C	1.93	C	0.763	C	1.33
2,2',3,4,6' - PeCB	89	U		U		U		U	
2,2',3,4',5 - PeCB	90	C	35.8	C	17.7	C	8.04	C	9.08
2,2',3,4',6 - PeCB	91	C88		C88		C88		C88	
2,2',3,5,5' - PeCB	92	U			3.13		1.35		1.66
2,2',3,5,6 - PeCB	93	C R	23.1	C	13.5	C	6.38	C	10
2,2',3,5,6' - PeCB	94	U		U		U		U	
2,2',3,5',6 - PeCB	95	C93		C93		C93		C93	
2,2',3,6,6' - PeCB	96	U		U		U		U	

		Blank		Athabasca River				Happy Creek	
Sample Description:		Lab Blank (QA)		Atha. R., at Brule Lake near Mouth		Atha R., u/s Maskuta Creek		Happy Creek near Mouth	
Sample Date:		N/A		15-Dec-2000		15-Dec-2000		15-Dec-2000	
Latitude/Longitude:				53°19'45" 117°5015"		53°22'52" 117°39'51"		53°24'00" 117°36'15"	
Lab No.:		WG3934-101		L3042-1 i		L3042-3 i		L3042-5 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3',4,5 - PeCB	97	C86		C86		C86		C86	
2,2',3',4,6 - PeCB	98	C93		C93		C93		C93	
2,2',4,4',5 - PeCB	99	C83		C83		C83		C83	
2,2',4,4',6 - PeCB	**100**	**C93**		**C93**		**C93**		**C93**	
2,2',4,5,5' - PeCB	**101**	**C90**		**C90**		**C90**		**C90**	
2,2',4,5,6' - PeCB	**102**	**C93**		**C93**		**C83**		**C93**	
2,2',4,5',6 - PeCB	103	U		U		U		U	
2,2',4,6,6' - PeCB	104	U		U		U		U	
2,3,3',4,4' - PeCB	105		9.64		6.58		3.27		3.13
2,3,3',4,5 - PeCB	**106**	**U**		**U**		**U**		**U**	
2,3,3',4',5 - PeCB	**107**	**C U**		**C**	**0.678**	**C**	**0.335**	**C**	**0.31**
2,3,3',4,5' - PeCB	**108**	**C86**		**C86**		**C86**		**C86**	
2,3,3',4,6 - PeCB	109	U			1.24		0.611		0.587
2,3,3',4',6 - PeCB	110	C	29.7	C	20.9	C	10.3	C	13.6
2,3,3',5,5' - PeCB	111	U		U		U		U	
2,3,3',5,6 - PeCB	**112**	**U**		**U**		**U**		**U**	
2,3,3',5',6 - PeCB	**113**	**C90**		**C90**		**C90**		**C90**	
2,3,4,4',5 - PeCB	**114**	**U**			**0.332**	**U**		**U**	
2,3,4,4',6 - PeCB	115	C110		C110		C110		C110	
2,3,4,5,6 - PeCB	116	C85		C85		C85		C85	
2,3,4',5,6 - PeCB	117	C85		C85		C85		C85	
2,3',4,4',5 - PeCB	**118**		**24.3**		**15.9**		**7.92**		**7.47**
2,3',4,4',6 - PeCB	**119**	**C86**		**C86**		**C86**		**C86**	
2,3',4,5,5' - PeCB	**120**	**U**		**U**		**U**		**U**	
2,3',4,5',6 - PeCB	121	U		U		U		U	
2',3,3',4,5 - PeCB	122	U		U		U		U	
2',3,4,4',5 - PeCB	123	U			0.244	U		U	
2',3,4,5,5' - PeCB	**124**	**C107**		**C107**		**C107**		**C107**	
2',3,4,5,6' - PeCB	**125**	**C86**		**C86**		**C86**		**C86**	
3,3',4,4',5 - PeCB	**126**	**U**		**U**		**U**		**U**	
3,3',4,5,5' - PeCB	127	U		U		U		U	
2,2',3,3',4,4' - HxCB	128	C U		C	3.13	C	1.61	C	2.75
2,2',3,3',4,5 - HxCB	129	C	28.8	C	18	C	8.55	C	19.2
2,2',3,3',4,5' - HxCB	**130**	**U**			**1.07**		**0.575**		**1.33**
2,2',3,3',4,6 - HxCB	**131**	**U**			**0.338**	**U**		**R**	**0.308**
2,2',3,3',4,6' - HxCB	**132**	**U**			**5.99**		**3.01**		**7.24**
2,2',3,3',5,5' - HxCB	133	U		U		U		U	
2,2',3,3',5,6 - HxCB	134	CU		C	0.878	C	0.491	C	0.789
2,2',3,3',5,6' - HxCB	135	CU		C	4.2	C	2.48	C	7.7
2,2',3,3',6,6' - HxCB	**136**	**U**			**1.96**		**1.02**		**2.92**
2,2',3,4,4',5 - HxCB	**137**	**U**			**0.757**		**0.541**		**0.94**
2,2',3,4,4',5' - HxCB	**138**	**C129**		**C129**		**C129**		**C129**	
2,2',3,4,4',6 - HxCB	139	C U		C	0.267	C U		C R	0.199
2,2',3,4,4',6' - HxCB	140	C139		C139		C139		C139	
2,2',3,4,5,5' - HxCB	141	U			2.93		1.51		4.55
2,2',3,4,5,6 - HxCB	**142**	**U**		**U**		**U**		**U**	
2,2',3,4,5,6' - HxCB	**143**	**C134**		**C134**		**C134**		**C134**	
2,2',3,4,5',6 - HxCB	**144**	**U**			**0.595**		**0.303**		**1.02**

		Blank		Athabasca River				Happy Creek	
Sample Description:		Lab Blank (QA)		Atha. R., at Brule Lake near Mouth		Atha R., u/s Maskuta Creek		Happy Creek near Mouth	
Sample Date:		N/A		15-Dec-2000		15-Dec-2000		15-Dec-2000	
Latitude/Longitude:				53°19'45" 117°5015"		53°22'52" 117°39'51"		53°24'00" 117°36'15"	
Lab No.:		WG3934-101		L3042-1 i		L3042-3 i		L3042-5 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,2',3,4,6,6' - HxCB	145	U		U		U		U	
2,2',3,4',5,5' - HxCB	146	U			2.35		1.6		3.2
2,2',3,4',5,6 - HxCB	147	C R	18.7	C	11.4	C	6.1	C	18
2,2',3,4',5,6' - HxCB	**148**	**U**		**U**		**U**		**U**	
2,2',3,4',5',6 - HxCB	**149**	**C147**		**C147**		**C147**		**C147**	
2,2',3,4',6,6' - HxCB	**150**	**U**		**U**		**U**		**U**	
2,2',3,5,5',6 - HxCB	151	C135		C135		C135		C135	
2,2',3,5,6,6' - HxCB	152	U		U		U		U	
2,2',4,4',5,5' - HxCB	153	C R	22.4	C	11.3	C	6.45	C	17.1
2,2',4,4',5,6' - HxCB	**154**	**C135**		**C135**		**C135**		**C135**	
2,2',4,4',6,6' - HxCB	**155**	**U**		**U**		**U**		**U**	
2,3,3',4,4',5 - HxCB	**156**	**C R**	**6.91**	**C**	**2.39**	**C**	**1.21**	**C**	**1.72**
2,3,3',4,4',5' - HxCB	157	C156		C156		C156		C156	
2,3,3',4,4',6 - HxCB	158	U			1.99		0.938		1.92
2,3,3',4,5,5' - HxCB	159	U		U		U			0.357
2,3,3',4,5,6 - HxCB	**160**	**C129**		**C129**		**C129**		**C129**	
2,3,3',4,5',6 - HxCB	**161**	**U**		**U**		**U**		**U**	
2,3,3',4',5,5' - HxCB	**162**	**U**		**U**		**U**		**U**	
2,3,3',4',5,6 - HxCB	163	C129		C129		C129		C129	
2,3,3',4',5',6 - HxCB	164	U			1.31		0.516		1.45
2,3,3',5,5',6 - HxCB	165	U		U		U		U	
2,3,4,4',5,6 - HxCB	**166**	**C128**		**C128**		**C128**		**C128**	
2,3',4,4',5,5' - HxCB	**167**		**5.07**		**0.686**		**0.372**		**0.741**
2,3',4,4',5',6 - HxCB	**168**	**C153**		**C153**		**C153**		**C153**	
3,3',4,4',5,5' - HxCB	169	U		U		U		U	
2,2',3,3',4,4',5 - HpCB	170	U			3.06		1.79		7.05
2,2',3,3',4,4',6 - HpCB	171	C U		C	0.768	C	0.356	C	2.29
2,2',3,3',4,5,5' - HpCB	**172**	**U**		**R**	**0.482**		**0.345**		**1.3**
2,2',3,3',4,5,6 - HpCB	**173**	**C171**		**C171**		**C171**		**C171**	
2,2',3,3',4,5,6' - HpCB	**174**	**U**			**2.94**		**1.64**		**8.21**
2,2',3,3',4,5',6 - HpCB	175	U		U		U			0.348
2,2',3,3',4,6,6' - HpCB	176	U			0.379	R	0.237		0.982
2,2',3,3',4',5,6 - HpCB	177	U			1.73		0.897		4.42
2,2',3,3',5,5',6 - HpCB	**178**	**U**		**R**	**0.646**	**R**	**0.292**		**1.48**
2,2',3,3',5,6,6' - HpCB	**179**	**U**			**1.01**		**0.715**		**3.26**
2,2',3,4,4',5,5' - HpCB	**180**	**C U**		**C**	**5.3**	**C**	**3.49**	**C**	**16.3**
2,2',3,4,4,'5,6 - HpCB	181	U		U		U		U	
2,2',3,4,4',5,6' - HpCB	182	U		U		U		U	
2,2',3,4,4',5',6 - HpCB	183	C U		C U		C	1.11	C	5.15
2,2',3,4,4',6,6' - HpCB	**184**	**U**		**U**		**U**		**U**	
2,2',3,4,5,5',6 - HpCB	**185**	**C183**		**C183**		**C183**		**C183**	
2,2',3,4,5,6,6' - HpCB	**186**	**U**		**U**		**U**		**U**	
2,2',3,4',5,5',6 - HpCB	187	R	7.98		3.02		1.99		9.32
2,2',3,4',5,6,6' - HpCB	188	U		U		U		U	
2,3,3',4,4',5,5' - HpCB	189	U			0.167	U			0.186
2,3,3',4,4',5,6 - HpCB	**190**	**U**			**0.588**		**0.285**		**1.32**
2,3,3',4,4',5',6 - HpCB	**191**	**U**		**U**		**U**			**0.301**
2,3,3',4,5,5',6 - HpCB	**192**	**U**		**U**		**U**		**U**	

		Blank		Athabasca River				Happy Creek	
Sample Description:		Lab Blank (QA)		Atha. R., at Brule Lake near Mouth		Atha R., u/s Maskuta Creek		Happy Creek near Mouth	
Sample Date:		N/A		15-Dec-2000		15-Dec-2000		15-Dec-2000	
Latitude/Longitude:				53°19'45" 117°5015"		53°22'52" 117°39'51"		53°24'00" 117°36'15"	
Lab No.:		WG3934-101		L3042-1 i		L3042-3 i		L3042-5 i	
ANALYTE	IUPAC NO.	FLAG	CONC.[2]	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
2,3,3',4',5,5',6 - HpCB	193	C180		C180		C180		C180	
2,2',3,3',4,4',5,5' - OcCB	194	U			1.15		0.825		2.68
2,2',3,3',4,4',5,6 - OcCB	195	U		R	0.599		0.361		1.03
2,2',3,3',4,4',5,6' - OcCB	**196**	**U**			**0.715**		**0.324**		**1.9**
2,2',3,3',4,4',6,6' - OcCB	**197**	**C U**		**C R**	**0.364**	**C U**		**C**	**0.7**
2,2',3,3',4,5,5',6 - OcCB	**198**	**C U**		**C**	**1.55**	**C**	**0.679**	**C**	**3.69**
2,2',3,3',4,5,5',6' - OcCB	199	C198		C198		C198		C198	
2,2',3,3',4,5,6,6' - OcCB	200	C197		C197		C197		C197	
2,2',3,3',4,5',6,6' - OcCB	201	U			0.173		0.193		0.47
2,2',3,3',5,5',6,6' - OcCB	**202**	**U**		**R**	**0.299**	**U**			**0.839**
2,2',3,4,4',5,5',6 - OcCB	**203**	**U**			**0.896**		**0.462**		**2.3**
2,2',3,4,4',5,6,6' - OcCB	**204**	**U**		**R**	**2.07**		**1.83**		**2.12**
2,3,3',4,4',5,5',6 - OcCB	205	U		U		U			0.186
2,2',3,3',4,4',5,5',6 - NoCB	206	U		R	0.709	R	0.291		1.04
2,2',3,3',4,4',5,6,6' - NoCB	207	U		U		U		U	
2,2',3,3',4,5,5',6,6' - NoCB	**208**	**U**			**0.269**		**0.237**		**0.375**
2,2',3,3',4,4',5,5',6,6' - DeCB	**209**	**R**	**15**	**R**	**0.355**		**0.348**		**1.13**
ΣPCBs[1]			**1643.11**		**283.464**		**150.865**		**279.683**

[1]Excludes R flagged values

[2]Concentrations as pg/g dry wt., except aqueous samples as pg/L

Flag: U = Not Detected; R = Peak detected but not confirmed by ratio; C = Coelutes with

Analysis by Axys Analytical Services Ltd., Feb-Mar 2001

	Hardisty Creek		Athabasca River							
	Hardisty Creek near Mouth		Atha R., d/s Maskuta Crk to HCE RB, Site 1		Atha R., d/s Maskuta Crk to HCE RB, Site 2		Atha R., d/s HCE to Obed Coal RB, Site 1		Atha R., d/s HCE to Obed Coal RB, Site 2	
	24-Oct-2000		24-Oct-2000		24-Oct-2000		11-Oct-2000		11-Oct-2000	
	53°25'20" 117°34'10"		53°23'12" 117°38'19"		53°24'29" 117°35'30"		53°26'26" 117°31'26"		53°27'37" 117°28'13"	
	L3042-7 i		L3042-9 i		L3042-11 i		L3042-13 i		L3042-15	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1		2.37		1.41		1.36		1.85		1.33
2		5.21		1.27		0.686		0.721		0.953
3		2.78		1.16		0.916		1.17		1.17
4		1.38		1		0.949		1.2		0.902
5	U		U		U		U		U	
6		1.1		0.429		0.429		0.424		0.53
7		0.298	U		U		U		U	
8		4.69		2.11		2.04		2.16		3.17
9		0.274	U		U		U		U	
10	U		U		U		U		U	
11		58.7		8.91		3.69		2.04		4.84
12	C	1.7	C	0.83	C	0.548	C	0.627	C	0.766
13	C12		C12		C12		C12		C12	
14		0.34	U		U		U		U	
15		7.8		1.32		1.21		1.37		3.1
16		1.54		0.951		0.913		1		1.2
17		1.89	R	0.91		0.877		0.927		1.28
18	C	3.59	C	2	C	2.09	C	2.27	C	2.83
19		0.605	R	0.271		0.284		0.339		0.317
20	C	10.2	C	3.24	C	2.9	C	2.8	C	4.42
21	C	4.67	C	1.44	C	1.47	C	1.29	C	1.9
22		3.43		1.06		1		0.918		1.44
23	U		U		U		U		U	
24	U		U		U		U		U	
25		0.675		0.166	R	0.198		0.15		0.262
26	C	1.46	C	0.47	C	0.512	C	0.421	C	0.723
27		0.391		0.124	U			0.158	R	0.168
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		7.74		2.69		2.57		2.42		3.68
32		1.27		0.576		0.538		0.638		0.815
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35		1.57		0.18	U		U		U	
36		0.481	U		U		U		U	
37		7		0.791		0.894		0.818		1.15
38		0.476		0.822		0.671		0.727		0.841
39	U		U		U		U		U	
40	C	6.37	C	1.35	C	1.33	C	2.14	C	1.77
41	C40		C40		C40		C40		C40	
42		2.51		0.59		0.468		0.809		0.691
43	U		U		U		U		U	
44	C	14.7	C	4.11	C	3.54	C	5.57	C	5.64
45	C	2.04	C	0.451	C	0.341	C	0.74	C	0.616
46		0.871	U		U		U		U	
47	C44		C44		C44		C44		C44	
48		1.26	R	0.337		0.401		0.485		0.623

	Hardisty Creek		Athabasca River							
	Hardisty Creek near Mouth		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s HCE to Obed Coal RB		Atha R., d/s HCE to Obed Coal RB	
	15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000	
	53°25'20" 117°34'10"		53°23'12" 117°38'19"		53°24'29" 117°35'30"		53°26'26" 117°31'26"		53°27'37" 117°28'13"	
	L3042-7 i		L3042-9 i		L3042-11 i		L3042-13 i		L3042-15	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	C	7.15	C	2.09	C	1.94	C	2.8	C	2.6
50	C	2.24	C	0.378	C	0.334	C	0.566	C	0.465
51	C45		C45		C45		C45		C45	
52		33.1		8.28		6.84		10		8.96
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56		8.19		1.25		1.07		1.53		1.58
57	U		U		U		U		U	
58	U		U		U		U		U	
59	C	1.25	C	0.183	C	0.184	C	0.22	C	0.227
60		3.29	R	0.707		0.517		0.828		0.867
61	C	35.3	C	8.17	C	6.17	C	8.05	C	9.54
62	C59		C59		C59		C59		C59	
63		0.374	U		U			0.122	R	0.113
64		6.43		1.65		1.34		2.04	R	1.92
65	C44		C44		C44		C44		C44	
66		16		2.92		2.32		3.34		3.9
67		0.364	U		U		U			0.103
68		0.3	U		U			0.123		0.148
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77		5.04		0.484	R	0.259		0.817		0.681
78	U		U		U		U		U	
79		0.807	U		U			0.186	U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82		11.2		1.59		1.14		2.35		1.56
83	C	48.1	C	8.17	C	5.07	C	12	C	7.82
84		35.5		3.86		2.38		6.08		3.82
85	C	11.8	C	2.06	C	1.35	C	2.95	C	2.2
86	C	70.7	C	10.7	C	6.36	C	16.5	C	10.9
87	C86		C86		C86		C86		C86	
88	C	14.5	C	1.76	C	1.05	C	2.58	C	1.72
89		0.797	U		U		U		U	
90	C	103	C	14.6	C	8.95	C	31.8	C	16.7
91	C88		C88		C88		C88		C88	
92		20.7		2.64		1.48		5.65		2.95
93	C	128	C	12.5	C	7.88	C	27.3	C	13.4
94	R	0.369	U		U		U		U	
95	C93		C93		C93		C93		C93	
96		0.498	U		U		U		U	

	Hardisty Creek		Athabasca River					
	Hardisty Creek near Mouth 15-Dec-2000 53°25'20" 117°34'10" L3042-7 i		Atha R., d/s Maskuta Crk to HCE RB 15-Dec-2000 53°23'12" 117°38'19" L3042-9 i		Atha R., d/s Maskuta Crk to HCE RB 15-Dec-2000 53°24'29" 117°35'30" L3042-11 i		Atha R., d/s HCE to Obed Coal RB 15-Dec-2000 53°26'26" 117°31'26" L3042-13 i		Atha R., d/s HCE to Obed Coal RB 15-Dec-2000 53°27'37" 117°28'13" L3042-15	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	**C93**		**C93**		**C93**		**C93**		**C93**	
101	**C90**		**C90**		**C90**		**C90**		**C90**	
102	**C93**		**C93**		**C93**		**C93**		**C93**	
103	R	0.81	U		U		U		U	
104	U		U		U		U		U	
105		38.3		5.85		3.3		7.28		6.34
106	**U**		**U**		**U**		**U**		**U**	
107	**C**	**4.23**	**C**	**0.513**	**C**	**0.295**	**C**	**0.807**	**C**	**0.648**
108	**C86**		**C86**		**C86**		**C86**		**C86**	
109		6.99		0.936		0.479		1.47		1.07
110	C	160	C	17.6	C	11.2	C	35.8	C	19.6
111	U		U		U		U		U	
112	**U**		**U**		**U**		**U**		**U**	
113	**C90**		**C90**		**C90**		**C90**		**C90**	
114		**1.38**	**U**		**U**		**U**		**R**	**0.301**
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		**91.8**		**13.9**		**7.79**		**18.9**		**15**
119	**C86**		**C86**		**C86**		**C86**		**C86**	
120	**R**	**0.268**	**U**		**U**		**U**		**U**	
121	U		U		U		U		U	
122		1.21	U		U		U		U	
123		1.39	U		U		U			0.326
124	**C107**		**C107**		**C107**		**C107**		**C107**	
125	**C86**		**C86**		**C86**		**C86**		**C86**	
126		**0.887**	**U**		**U**		**U**		**U**	
127	U		U		U		U		U	
128	C	35.8	C	2.96	C	1.28	C	7.28	C	3.22
129	C	237	C	18.7	C	8.99	C	71.5	C	23.6
130		**16.9**		**1.29**		**0.589**		**3.32**		**1.28**
131		**3.26**	**U**		**U**			**0.66**	**R**	**0.325**
132		**89.9**		**8.18**		**3.07**		**22.9**		**7.67**
133		3.25	U		U			0.746	U	
134	C	11.6	C	0.959	CR	0.38	C	3.35	C	1.04
135	C	106	C	5.46	C	2.77	C	31.8	CU	
136		**37**		**2.35**		**1.1**		**10.2**		**2.88**
137	**U**			**1.09**		**0.545**		**1.31**		**0.769**
138	**C129**		**C129**		**C129**		**C129**		**C129**	
139	C	3.97	C	0.23	C U		C	0.498	C R	0.302
140	C139		C139		C139		C139		C139	
141		46		3.26	R	1.45		15.6		4.74
142	**U**		**U**		**U**		**U**		**U**	
143	**C134**		**C134**		**C134**		**C134**		**C134**	
144		**15.8**		**1.2**		**0.516**		**5.9**		**1.57**

	Hardisty Creek		Athabasca River							
	Hardisty Creek near Mouth		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s HCE to Obed Coal RB		Atha R., d/s HCE to Obed Coal RB	
	15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000	
	53°25'20" 117°34'10"		53°23'12" 117°38'19"		53°24'29" 117°35'30"		53°26'26" 117°31'26"		53°27'37" 117°28'13"	
	L3042-7 i		L3042-9 i		L3042-11 i		L3042-13 i		L3042-15	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	U		U		U		U		U	
146		42.8		2.71		1.18		12.1		3.8
147	C	230	C	13.2	C	6.21	C	67.2	C	18.9
148	**U**		**U**		**U**		**U**		**U**	
149	**C147**		**C147**		**C147**		**C147**		**C147**	
150	**R**	**0.295**	**U**		**U**		**U**		**U**	
151	C135		C135		C135		C135		C135	
152		0.238	U		U		U		U	
153	C	202	C	14.2	C	6.31	C	68.1	C	20.1
154	**C135**		**C135**		**C135**		**C135**		**C135**	
155	**U**		**U**		**U**		**U**		**U**	
156	**C**	**21.8**	**C**	**2.36**	**C**	**1.04**	**C**	**4.98**	**C**	**2.51**
157	C156		C156		C156		C156		C156	
158		24		1.93		0.823		6.42		2.22
159		4.89		0.208	U			1.68		0.456
160	**C129**		**C129**		**C129**		**C129**		**C129**	
161	**U**		**U**		**U**		**U**		**U**	
162	**R**	**0.576**	**U**		**U**		**U**		**U**	
163	C129		C129		C129		C129		C129	
164		26		1.27		0.545		5.22		1.61
165	U		U		U		U		U	
166	**C128**		**C128**		**C128**		**C128**		**C128**	
167		**9.31**		**0.756**		**0.325**		**2.38**		**0.862**
168	**C153**		**C153**		**C153**		**C153**		**C153**	
169	U		U		U		U		U	
170		82.8		5.87		1.3		24.9		6.98
171	C	27.3	C	1.43	C R	0.447	C	8.69	C	2.17
172		**17**		**0.936**		**0.328**		**5.14**	**R**	**1.35**
173	**C171**		**C171**		**C171**		**C171**		**C171**	
174		**104**		**4.8**		**1.27**		**30**		**7.58**
175		4.15	U		U			1.3		0.303
176		12		0.584	U			3.79		0.848
177		64.7		2.67		0.936		19.1		5.16
178		**21**		**0.974**		**0.36**		**5.91**		**1.45**
179		**43.7**		**1.79**	**R**	**0.65**		**12.5**		**3.16**
180	**C**	**206**	**C**	**11.2**	**C**	**2.89**	**C**	**59.2**	**C**	**15.9**
181		0.437	U		U		U		U	
182	U		U		U		U		U	
183	C	68	C	3.43	C	0.958	C	19.4	C	5.38
184	**U**		**U**		**U**		**U**		**U**	
185	**C183**		**C183**		**C183**		**C183**		**C183**	
186	**U**		**U**		**U**		**U**		**U**	
187		127		5.14		1.75		37.2		9.5
188	U		U		U		U		U	
189		2.72		0.278	U		R	0.964	R	0.256
190		**17**		**1.11**		**0.345**		**5.45**		**1.52**
191		**3.9**	**U**		**U**			**1.08**		**0.309**
192	**U**		**U**		**U**		**U**		**U**	

	Hardisty Creek		Athabasca River							
	Hardisty Creek near Mouth		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s Maskuta Crk to HCE RB		Atha R., d/s HCE to Obed Coal RB		Atha R., d/s HCE to Obed Coal RB	
	15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000	
	53°25'20" 117°34'10"		53°23'12" 117°38'19"		53°24'29" 117°35'30"		53°26'26" 117°31'26"		53°27'37" 117°28'13"	
	L3042-7 i		L3042-9 i		L3042-11 i		L3042-13 i		L3042-15	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
193	C180		C180		C180		C180		C180	
194		40.1		4.62		0.562		11.6		3.06
195		17.1		1.7	U			5.29		1.43
196		**21.6**		**2.09**	**U**			**6.13**		**1.7**
197	**C**	**9.08**	**C**	**0.766**	**C U**		**C**	**2.97**	**C**	**0.811**
198	**C**	**48.7**	**C**	**4.15**	**C**	**0.74**	**C**	**13.2**	**C**	**3.64**
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201		5.96		0.411	U			1.54		0.386
202		**9.23**		**0.506**	**U**			**2.35**		**0.736**
203		**26.4**		**2.48**		**0.418**		**7.65**		**2**
204		**1.83**		**2.12**		**1.92**		**2.08**		**2.34**
205		2.03	U		U			0.556	R	0.207
206		12.5		1.78	U			2.75		0.963
207		1.65	U		U		R	0.371	R	0.273
208		**2.73**	**U**		**U**			**0.543**	**R**	**0.23**
209		**2.73**		**0.382**	**U**		**R**	**0.277**		**0.386**
ΣPCBs[1]		**3203.073**		**303.074**		**161.136**		**871.734**		**355.043**

	Athabasca River									
	Atha R., d/s HCE to Obed Coal RB, Site 3 11-Oct-2000 53°29'05" 117°27'56" L3042-17		Atha R., d/s HCE to Obed Coal RB (site 1 dupl. (aka Atha R. d/s 11-Oct-2000 53°26'26" 117°31'26" L3042-19		Atha R., d/s Obed to Emerson Br., Site 1 11-Oct-2000 53°33'09" 117°19'35" L3042-21		Atha R., u/s Emerson Br. 11-Oct-2000 53°41'57" 117°09'41" L3042-23		Atha R., d/s Emerson Br. 11-Oct-2000 53°42'17" 117°09'50" L3042-25	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1		1.6		1.55		1.33		1.69		1.41
2		0.794		0.699		0.952		0.734		0.665
3		1.24		1.08		1.07		1.31		1.09
4		1.08		1.07		0.923		0.962		0.826
5	U		U		U		U		U	
6		0.43		0.462		0.406		0.401		0.45
7	U		U		U		U		U	
8		2.39		2.26		2.15		2.78		2.18
9	U		U		U		U		U	
10	U		U		U		U		U	
11		6.2		2.05		1.9		1.99		4.07
12	C	0.743	C	0.679	C	0.615	C	0.619	C	0.598
13	C12		C12		C12		C12		C12	
14	U		U		U		U		U	
15		2.01		1.24		1.79		3.16		2.31
16		1.02		0.958		0.827		0.825		0.791
17		1.03		1.06		0.842		0.893		0.879
18	C	2.17	C	2.24	C	2.05	C	1.89	C	1.75
19		0.315		0.316		0.26		0.209		0.207
20	C	2.77	C	2.76	C	2.72	C	2.89	C	2.8
21	C	1.36	C	1.41	C	1.28	C	1.39	C	1.3
22		0.958		1.02		0.892		1.03		0.907
23	U		U		U		U		U	
24	U		U		U		U		U	
25		0.177		0.181		0.196		0.165		0.183
26	C	0.441	C	0.529	C	0.487	C	0.435	C	0.512
27		0.158	R	0.165	R	0.141	R	0.137		0.136
28	C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18	
31		2.46		2.45		2.42		2.56		2.5
32		0.617		0.647		0.575		0.516		0.473
33	C21		C21		C21		C21		C21	
34	U		U		U		U		U	
35		0.138	U			0.14		0.146		0.173
36	U		U		U		U		U	
37		0.661		0.518		0.621		0.716		0.854
38		0.698		0.716		0.679		0.586	R	0.622
39	U		U		U		U		U	
40	C	1.24	C	1.46	C	1.42	C	1.3	C	1.36
41	C40		C40		C40		C40		C40	
42		0.582		0.581		0.597		0.556		0.59
43	U		U		U		U		U	
44	C	3.71	C	3.53	C	3.78	C	4.27	C	3.21
45	C	0.494	C	0.514	C	0.51	C	0.532	C	0.443
46	R	0.169		0.16	U		R	0.161	U	
47	C44		C44		C44		C44		C44	
48		0.412		0.409		0.417		0.433		0.443

	Athabasca River									
	Atha R., d/s HCE to Obed Coal RB		Atha R., d/s HCE to Obed Coal RB (site 1 dupl. (aka Atha R. d/s		Atha R., d/s Obed to Emerson br.		Atha R., u/s Emerson br.		Atha R., d/s Emerson br.	
	15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000	
	53°29'05"	117°27'56"	53°26'26"	117°31'26"	53°33'09"	117°19'35"	53°41'57"	117°09'41"	53°42'17"	117°09'50"
	L3042-17		L3042-19		L3042-21		L3042-23		L3042-25	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	C	2.03	C	1.91	C	1.82	C	2.16	C	1.75
50	C	0.445	C	0.427	C	0.409	C	0.353	C	0.315
51	C45		C45		C45		C45		C45	
52		6.91		6.23		6.58		7.42		5.67
53	C50		C50		C50		C50		C50	
54	U		U		U		U		U	
55	U		U		U		U		U	
56		1.11		0.921		1.16		1.27		1.17
57	U		U		U		U		U	
58	U		U		U		U		U	
59	C R	0.202	C R	0.241	C R	0.201	C	0.172	C	0.185
60		0.596		0.484		0.589		0.674		0.535
61	C	6.89	C	5.65	C	6.87	C	7.94	C	6.9
62	C59		C59		C59		C59		C59	
63	U		U		U		U		U	
64		1.38		1.24		1.31		1.47		1.3
65	C44		C44		C44		C44		C44	
66		2.33		1.84		2.45		2.71		2.34
67	U		U		U		U		U	
68	U		U			0.12	U		U	
69	C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40	
72	U		U		U		U		U	
73	U		U		U		U		U	
74	C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61	
77		0.406		0.266		0.435		0.455		0.421
78	U		U		U		U		U	
79	U		U		U		R	0.14	U	
80	U		U		U		U		U	
81	U		U		U		U		U	
82		1.37		1.01		1.23		1.46		1.14
83	C	7.11	C	4.76	C	5.76	C	6.83	C	5.53
84		3.26		2.33		2.75		3.25		2.25
85	C	1.9	C	1.27	C	1.47	C	1.81	C	1.48
86	C	8.6	C	6.27	C	7.73	C	10.2	C	7.61
87	C86		C86		C86		C86		C86	
88	C	1.43	C	1.05	C	1.21	C	1.38	C	0.972
89	U		U		U		U		U	
90	C	13.1	C	8.94	C	10.8	C	19.6	C	10.6
91	C88		C88		C88		C88		C88	
92		2.37		1.58		1.97		2.97		1.64
93	C	10.4	C	7.37	C	9.15	C	15.4	C	8.04
94	U		U		U		U		U	
95	C93		C93		C93		C93		C93	
96	U		U		U		U		U	

	Athabasca River									
	Atha R., d/s HCE to Obed Coal RB 15-Dec-2000 53°29'05" 117°27'56" L3042-17		Atha R., d/s HCE to Obed Coal RB (site 1 dupl. (aka Atha R. d/s 15-Dec-2000 53°26'26" 117°31'26" L3042-19		Atha R., d/s Obed to Emerson br. 15-Dec-2000 53°33'09" 117°19'35" L3042-21		Atha R., u/s Emerson br. 15-Dec-2000 53°41'57" 117°09'41" L3042-23		Atha R., d/s Emerson br. 15-Dec-2000 53°42'17" 117°09'50" L3042-25	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93	
103	U		U		U		U		U	
104	U		U		U		U		U	
105		4.25		2.69		4.1		5.43		4.28
106	U		U		U		U		U	
107	C R	0.524	C R	0.302	C	0.359	C	0.487	C	0.349
108	C86		C86		C86		C86		C86	
109		0.673		0.487		0.776		0.873		0.694
110	C	15.1	C	10.6	C	12.3	C	17.8	C	12.1
111	U		U		U		U		U	
112	U		U		U		U		U	
113	C90		C90		C90		C90		C90	
114		0.245		0.183		0.211	U			0.248
115	C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85	
118		10.5		6.55		9.25		12.7		10
119	C86		C86		C86		C86		C86	
120	U		U		U		U		U	
121	U		U		U		U		U	
122	U		U		U		U		U	
123		0.288		0.163	U			0.293	U	
124	C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86	
126	U		U		U		U		U	
127	U		U		U		U		U	
128	C	2.18	C	1.33	C	1.8	C	3.3	C	1.93
129	C	13.4	C	9.2	C	13.1	C	32.1	C	12.4
130		0.907		0.485		0.825		1.55		0.69
131	U		U		U			0.31	U	
132		4.73		3.29		4.42		10.6		3.98
133	U		U		U			0.513	U	
134	C	0.828	C	0.387	C	0.602	C	1.52	C	0.526
135	C	4.47	C	3.11	C	4.8	C	15.2	C	4.31
136		1.88		1.28		1.58		5.39		1.59
137		0.72		0.456		0.535		0.786		0.608
138	C129		C129		C129		C129		C129	
139	C	0.225	C U		C U		C	0.255	C U	
140	C139		C139		C139		C139		C139	
141		2.4		1.99		2.57		8.28		2.38
142	U		U		U		U		U	
143	C134		C134		C134		C134		C134	
144	R	0.551		0.46		0.609		2.09		0.531

	Athabasca River									
	Atha R., d/s HCE to Obed Coal RB 15-Dec-2000 53°29'05" 117°27'56" L3042-17		Atha R., d/s HCE to Obed Coal RB (site 1 dupl. (aka Atha R. d/s 15-Dec-2000 53°26'26" 117°31'26" L3042-19		Atha R., d/s Obed to Emerson br. 15-Dec-2000 53°33'09" 117°19'35" L3042-21		Atha R., u/s Emerson br. 15-Dec-2000 53°41'57" 117°09'41" L3042-23		Atha R., d/s Emerson br. 15-Dec-2000 53°42'17" 117°09'50" L3042-25	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	U		U		U		U		U	
146		2.43		1.62		2.49		6.09		1.91
147	C	10.3	C	7.46	C	10.3	C	31.2	C	10
148	**U**		**U**		**U**		**U**		**U**	
149	**C147**		**C147**		**C147**		**C147**		**C147**	
150	**U**		**U**		**U**		**U**		**U**	
151	C135		C135		C135		C135		C135	
152	U		U		U		U		U	
153	C	10.4	C	7.12	C	10.3	C	31.5	C	10.1
154	**C135**		**C135**		**C135**		**C135**		**C135**	
155	**U**		**U**		**U**		**U**		**U**	
156	**C**	**1.56**	**C**	**1**	**C**	**1.61**	**C**	**2.7**	**C**	**1.51**
157	C156		C156		C156		C156		C156	
158		1.34		0.919		1.33		3.13		1.23
159		0.197		0.157	U			0.63	U	
160	**C129**		**C129**		**C129**		**C129**		**C129**	
161	**U**		**U**		**U**		**U**		**U**	
162	**U**		**U**		**U**		**U**		**U**	
163	C129		C129		C129		C129		C129	
164		0.843		0.637		0.89		2.25		0.864
165	U		U		U		U		U	
166	**C128**		**C128**		**C128**		**C128**		**C128**	
167		**0.569**		**0.289**		**0.492**		**0.95**	**R**	**0.626**
168	**C153**		**C153**		**C153**		**C153**		**C153**	
169	U		U		U		U		U	
170		2.93		1.82		3.06		11.3		2.61
171	C	0.996	C	0.535	C	0.833	C	3.27	C	0.72
172		**0.586**		**0.348**		**0.682**		**2.37**	**R**	**0.544**
173	**C171**		**C171**		**C171**		**C171**		**C171**	
174		**3.13**		**2.24**		**3.06**		**12.9**		**3.18**
175	R	0.143	U		U			0.473	U	
176		0.341		0.291		0.413		1.84	R	0.379
177		1.85		1.26		2.09		8.24		2.07
178		**0.669**		**0.39**		**0.786**		**2.61**		**0.589**
179		**1.18**		**0.833**		**1.34**		**5.35**		**1.2**
180	**C**	**5.7**	**C**	**4.41**	**C**	**6.73**	**C**	**24.3**	**C**	**6.32**
181	U		U		U		U		U	
182	U		U		U		U		U	
183	C	2	C	1.31	C	2.25	C	8.36	C	2.08
184	**U**		**U**		**U**		**U**		**U**	
185	**C183**		**C183**		**C183**		**C183**		**C183**	
186	**U**		**U**		**U**		**U**		**U**	
187		3.85		2.63		4.24		15.5		3.87
188	U		U		U		U		U	
189	R	0.127	U			0.123		0.342	U	
190		**0.558**		**0.441**		**0.541**		**2.46**		**0.532**
191	**U**		**U**		**U**			**0.459**	**U**	
192	**U**		**U**		**U**		U		**U**	

	Athabasca River									
	Atha R., d/s HCE to Obed Coal RB 15-Dec-2000 53°29'05" 117°27'56" L3042-17		Atha R., d/s HCE to Obed Coal RB (site 1 dupl. (aka Atha R. d/s 15-Dec-2000 53°26'26" 117°31'26" L3042-19		Atha R., d/s Obed to Emerson br. 15-Dec-2000 53°33'09" 117°19'35" L3042-21		Atha R., u/s Emerson br. 15-Dec-2000 53°41'57" 117°09'41" L3042-23		Atha R., d/s Emerson br. 15-Dec-2000 53°42'17" 117°09'50" L3042-25	
IUPAC NO.	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**	**FLAG**	**CONC.**
193	C180		C180		C180		C180		C180	
194		1.27		0.764		1.28		5.22	R	1.24
195		0.643		0.379		0.616		2.49		0.526
196		**0.713**	**R**	**0.491**		**0.88**		**3.1**		**0.786**
197	**C**	**0.317**	**C**	**0.175**	**C**	**0.399**	**C**	**1.26**	**C**	**0.366**
198	**C**	**1.61**	**C**	**1.18**	**C R**	**1.78**	**C**	**5.73**	**C**	**1.58**
199	C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197	
201	R	0.138	U			0.21		0.651	U	
202		**0.318**		**0.185**		**0.313**		**0.979**	**U**	
203		**0.836**		**0.696**	**R**	**1.08**		**3.27**		**0.961**
204		**1.91**		**1.78**	**R**	**1.92**		**2.01**		**2.38**
205	U		U		U			0.229	U	
206		0.531		0.248		0.524		1.41		0.473
207	U		U		U		U		U	
208		**0.178**	**U**		**U**			**0.416**	**U**	
209		**0.292**	**U**			**0.326**		**0.289**	**U**	
ΣPCBs[1]		**232.378**		**169.875**		**211.607**		**447.267**		**205.431**

	Athabasca River				Aqueous						Blank	
	Atha R., u/s Pine Ck (Knight Br.), Site 1 19-Oct-2000 54°09'00" 116°35'47" L3042-27		Atha R., u/s Windfall Br., Site 1 12-Oct-2000 54°13'14" 116°04'37" L3042-29		00SWES0007 Aqueous 15-Dec-2000 L3042-31 i		00SWES0051 Aqueous 15-Dec-2000 L3042-32		00SWES0106 Aqueous 15-Dec-2000 L3042-33		Lab Blank 07-Feb-2001 WG3968-101	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
1		1.4		1.44		100		32.1		78.9		0.796
2		0.581		0.686	U		U		U			0.188
3		0.95		0.957	R	43.1	U		U			0.331
4		0.757		0.8	U		U		U		U	
5	U		U		U		U		U		U	
6		0.39		0.307	U		U		U		U	
7	U		U		U		U		U		U	
8		2.35		2.01	U		R	50.2		62.2		0.847
9	U		U		U		U		U		U	
10	U		U		U		U		U		U	
11		2.44		4.16	U			45.9	U			10.7
12	C	0.457	C	0.644	C U		C U		C U		C U	
13	C12		C12		C12		C12		C12		C12	
14	U		U		U		U		U		U	
15		2.2		2.01	U		U		U		U	
16		0.762		0.581	U		U		U			0.328
17		0.726		0.613	U			15.3	U			0.335
18	C	1.58	C	1.34	C	38.2	C	31	C	34.9	C	0.684
19		0.187		0.172	U		U		U		U	
20	C	2.31	C	2.01	C	45.9	C R	41.7	C	48.4	C	0.64
21	C	1.07	C	0.842	C R	32.9	C	24.7	C	32.5	C	0.447
22		0.741		0.682	U			13.7	U			0.227
23	U		U		U		U		U		U	
24	U		U		U		U		U		U	
25		0.15	R	0.137	U		U		U		U	
26	C	0.351	C	0.33	C U		C U		C U		C U	
27		0.132		0.098	U		U		U		U	
28	C20		C20		C20		C20		C20		C20	
29	C26		C26		C26		C26		C26		C26	
30	C18		C18		C18		C18		C18		C18	
31		1.88		1.63		34.7		38.9		34.8		0.58
32		0.397		0.376	U		R	10.2	R	13		0.178
33	C21		C21		C21		C21		C21		C21	
34	U		U		U		U		U		U	
35	R	0.079	R	0.09	U		U		U		R	0.1
36	U		U		U		U		U		U	
37		0.551		0.518	U		U		U		R	0.1
38		0.415		0.685	U		U		U		U	
39	U		U		U		U		U		U	
40	C	0.901	C	0.935	C U		C U		C U		C R	0.177
41	C40		C40		C40		C40		C40		C40	
42		0.423		0.449	U		U		U		R	0.097
43	U		U		U		U		U		U	
44	C	2.57	C	2.6	C	30	C	155	C R	39.5	C R	0.626
45	C	0.4	C	0.334	C U		C	18.8	C U		C R	0.168
46	R	0.14	U		U		U		U		U	
47	C44		C44		C44		C44		C44		C44	
48	R	0.277		0.33	U		U		U		U	

	Athabasca River				Aqueous						Blank	
	Atha R., u/s Pine Creek (Knight br.) 15-Dec-2000 54°09'00" 116°35'47" L3042-27		Atha R., u/s Windfall br. 15-Dec-2000 54°13'14" 116°04'37" L3042-29		00SWES0007 Aqueous 15-Dec-2000 L3042-31 i		00SWES0051 Aqueous 15-Dec-2000 L3042-32		00SWES0106 Aqueous 15-Dec-2000 L3042-33		Lab Blank 07-Feb-2001 WG3968-101	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
49	C	1.37	C	1.46	C U		C	12.3	C U		C R	0.259
50	C R	0.249	C	0.27	C U		C U		C U		C U	
51	C45		C45		C45		C45		C45		C45	
52		4.42		4.46	U			33.9		27.9	R	0.496
53	C50		C50		C50		C50		C50		C50	
54	U		U		U		U		U		U	
55	U		U		U		U		U		U	
56		0.697		0.89	U		U		U		R	0.144
57	U		U		U		U		U		U	
58	U		U		U		U		U		U	
59	C R	0.148	C	0.182	C U		C U		C U		C U	
60		0.337		0.467	U		U		U		R	0.072
61	C	4.12	C	4.77	C R	31.2	C	26	C R	29	C	0.515
62	C59		C59		C59		C59		C59		C59	
63	U		U		U		U		U		U	
64		0.995		0.963	U		U		U			0.169
65	C44		C44		C44		C44		C44		C44	
66		1.3		1.84	U		R	19.2	U		R	0.26
67	U		U		U		U		U		U	
68	U		U		U			27.8	U		U	
69	C49		C49		C49		C49		C49		C49	
70	C61		C61		C61		C61		C61		C61	
71	C40		C40		C40		C40		C40		C40	
72	U		U		U		U		U		U	
73	U		U		U		U		U		U	
74	C61		C61		C61		C61		C61		C61	
75	C59		C59		C59		C59		C59		C59	
76	C61		C61		C61		C61		C61		C61	
77		0.254		0.341	U		U		U		U	
78	U		U		U		U		U		U	
79		0.273	U		U		U		U		U	
80	U		U		U		U		U		U	
81	U		U		U		U		U		U	
82		0.738		0.953	U		U		U		U	
83	C	3.43	C	5.18	C U		C	17	C U		C R	0.332
84		1.66		2.16	U		U		U		R	0.24
85	C	0.944	C	1.42	C U		C U		C U		C	0.095
86	C	5.6	C	7.07	C U		C	21	C	29.7	C R	0.731
87	C86		C86		C86		C86		C86		C86	
88	C	0.702	C	1.05	C U		C U		C U		C R	0.172
89	U		U		U		U		U		U	
90	C	7.67	C	14	C	37.4	C	30	C R	39.2	C	0.677
91	C88		C88		C88		C88		C88		C88	
92		1.33		2.21	U		U		U		R	0.124
93	C	6.16	C	9.55	C U		C	26.3	C U		C R	0.681
94	U		U		U		U		U		U	
95	C93		C93		C93		C93		C93		C93	
96	U		U		U		U		U		U	

	Athabasca River				Aqueous						Blank	
	Atha R., u/s Pine Creek (Knight br.) 15-Dec-2000 54°09'00" 116°35'47" L3042-27		Atha R., u/s Windfall br. 15-Dec-2000 54°13'14" 116°04'37" L3042-29		00SWES0007 Aqueous 15-Dec-2000 L3042-31 i		00SWES0051 Aqueous 15-Dec-2000 L3042-32		00SWES0106 Aqueous 15-Dec-2000 L3042-33		Lab Blank 07-Feb-2001 WG3968-101	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
97	C86		C86		C86		C86		C86		C86	
98	C93		C93		C93		C93		C93		C93	
99	C83		C83		C83		C83		C83		C83	
100	C93		C93		C93		C93		C93		C93	
101	C90		C90		C90		C90		C90		C90	
102	C93		C93		C93		C93		C93		C93	
103	U		U		U		U		U		U	
104	U		U		U		U		U		U	
105		2.38		3.51	U		R	12.5	U			0.222
106	U		U		U		U		U		U	
107	C	0.201	C	0.351	C U		C U		C U		C U	
108	C86		C86		C86		C86		C86		C86	
109		0.509	R	0.626	U		U		U		U	
110	C	8.46	C	13.8	C	40.4	C	36.9	C	21	C R	0.769
111	U		U		U		U		U		U	
112	U		U		U		U		U		U	
113	C90		C90		C90		C90		C90		C90	
114		0.2	U		U		U		U		U	
115	C110		C110		C110		C110		C110		C110	
116	C85		C85		C85		C85		C85		C85	
117	C85		C85		C85		C85		C85		C85	
118		5.94		8.8		28.4		33.6		43.2		0.453
119	C86		C86		C86		C86		C86		C86	
120	U		U		U		U		U		U	
121	U		U		U		U		U		U	
122	U		U		U		U		U		U	
123	U		R	0.16	U		U		U		U	
124	C107		C107		C107		C107		C107		C107	
125	C86		C86		C86		C86		C86		C86	
126	U		U		U		U		U		U	
127	U		U		U		U		U		U	
128	C	1.21	C	2.57	C U		C U		C U		C R	0.135
129	C	9.13	C	26.6	C	34.5	C R	33.4	C	39	C	1.41
130		0.557		1.1	U		U		U		U	
131	U		U		U		U		U		U	
132		3.2		7.03	U		U		U			0.425
133	U			0.291	U		U		U		U	
134	C	0.372	C	0.957	CU		CU		CU		CU	
135	C	3.9	C	8.27	CU		CU		CU		CR	0.431
136		1.28		2.44	U		U		U		R	0.127
137		0.307		0.431	U		U		U		U	
138	C129		C129		C129		C129		C129		C129	
139	C U		C U		C U		C U		C U		C U	
140	C139		C139		C139		C139		C139		C139	
141		1.85		6.26	U		U		U		R	0.192
142	U		U		U		U		U		U	
143	C134		C134		C134		C134		C134		C134	
144		0.495		1.13	U		U		U		U	

	Athabasca River				Aqueous						Blank	
	Atha R., u/s Pine Creek (Knight br.)		Atha R., u/s Windfall br.		00SWES0007 Aqueous		00SWES0051 Aqueous		00SWES0106 Aqueous		Lab Blank	
	15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		15-Dec-2000		07-Feb-2001	
	54°09'00" 116°35'47"		54°13'14" 116°04'37"									
	L3042-27		L3042-29		L3042-31 i		L3042-32		L3042-33		WG3968-101	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
145	U		U		U		U		U		U	
146		1.9		4.58	U		U		U		U	
147	C	7.77	C	18.1	C U		C R	21.4	C U		C R	1.18
148	**U**		**U**		**U**		**U**		**U**		**U**	
149	**C147**		**C147**		**C147**		**C147**		**C147**		**C147**	
150	**U**		**U**		**U**		**U**		**U**		**U**	
151	C135		C135		C135		C135		C135		C135	
152	U		U		U		U		U		U	
153	C	8.23	C	25	C U		C	32.8	C	48.9	C	1.04
154	**C135**		**C135**		**C135**		**C135**		**C135**		**C135**	
155	**U**		**U**		**U**		**U**		**U**		**U**	
156	**C**	**0.946**	**C**	**2.3**	**C U**		**C U**		**C U**		**C U**	
157	C156		C156		C156		C156		C156		C156	
158		1.03		2.59	U		U		U		U	
159	U			0.429	U		U		U		U	
160	**C129**		**C129**		**C129**		**C129**		**C129**		**C129**	
161	**U**		**U**		**U**		**U**		**U**		**U**	
162	**U**		**U**		**U**		**U**		**U**		**U**	
163	C129		C129		C129		C129		C129		C129	
164		0.609		1.72	U		U		U		U	
165	U		U		U		U		U		U	
166	**C128**		**C128**		**C128**		**C128**		**C128**		**C128**	
167		**0.272**		**0.83**	**U**		**U**		**U**		**U**	
168	**C153**		**C153**		**C153**		**C153**		**C153**		**C153**	
169	U		U		U		U		U		U	
170		2.47		10.6	U		U		U		R	0.478
171	C	0.756	C	2.47	C U		C U		C U		C R	0.251
172		**0.421**		**2.19**	**U**		**U**		**U**		**U**	
173	**C171**		**C171**		**C171**		**C171**		**C171**		**C171**	
174		**3.06**		**8.86**	**U**		**U**		**U**		**R**	**0.388**
175	U			0.301	U		U		U		U	
176	R	0.362		0.887	U		U		U		U	
177	R	1.69		5.5	U		U		U		R	0.398
178		**0.575**		**1.57**	**U**		**U**		**U**		**U**	
179		**1.32**		**2.64**	**U**		**U**		**U**			**0.198**
180	**C**	**5.75**	**C**	**23.2**	**C U**		**C U**		**C U**		**C**	**0.775**
181	U		U		U		U		U		U	
182	U		U		U		U		U		U	
183	C	1.8	C	5.51	C U		C U		C U		C	0.209
184	**U**		**U**		**U**		**U**		**U**		**U**	
185	**C183**		**C183**		**C183**		**C183**		**C183**		**C183**	
186	**U**		**U**		**U**		**U**		**U**		**U**	
187		3.54		10.1	U		U		U		R	0.522
188	U		U		U		U		U		U	
189	U			0.424	U		U		U		U	
190		**0.465**		**2.44**	**U**		**U**		**U**		**R**	**0.127**
191	**U**			**0.395**	**U**		**U**		**U**		**U**	
192	**U**		**U**		**U**		**U**		**U**		**U**	

	Athabasca River				Aqueous						Blank	
	Atha R., u/s Pine Creek (Knight br.) 15-Dec-2000 54°09'00" 116°35'47" L3042-27		Atha R., u/s Windfall br. 15-Dec-2000 54°13'14" 116°04'37" L3042-29		00SWES0007 Aqueous 15-Dec-2000 L3042-31		00SWES0051 Aqueous 15-Dec-2000 L3042-32		00SWES0106 Aqueous 15-Dec-2000 L3042-33		Lab Blank 07-Feb-2001 WG3968-101	
IUPAC NO.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.	FLAG	CONC.
193	C180		C180		C180		C180		C180		C180	
194		0.91		4.05	U		U		U		R	0.174
195		0.437		1.79	U		U		U		U	
196		0.502		2.06	U		U		U		U	
197	C R	0.236	C	0.787	C U		C U		C U		C U	
198	C	1.16	C R	4.17	C U		C U		C U		C R	0.172
199	C198		C198		C198		C198		C198		C198	
200	C197		C197		C197		C197		C197		C197	
201		0.154		0.425	U		U		U		U	
202		0.249	R	0.543	U		U		U		U	
203	R	0.618		2.48	U		U		U		U	
204		2.1		2.12	U		U		U			2.07
205	U		R	0.236	U		U		U		U	
206		0.312		0.983	U		U		U		U	
207	U		U		U		U		U		U	
208	U			0.144	U		U		U		U	
209		0.212		0.273	U		U		U		R	0.092
ΣPCBs[1]		156.012		318.063		389.5		673		501.4		24.537

Appendix B. Particle size, total organic carbon, and total PCBs in sediment samples Results are on a dry weight basis.

B1. Table

Site	Map Desig-nation	TOC (%)	Gravel (%) >2.00 mm	Sand (%) <2.00 mm >0.053 mm	Silt (%) <0.053 mm >0.002 mm	Clay (%) <0.002 mm	Σ PCB µg/kg
Athabasca River							
d/s Brule Lake	A1	3.54	0.00	12.73	80.24	7.03	0.283
u/s Maskuta Creek	A2	3.46/2.80	0.05	16.26	76.20	7.50	0.151
d/s Maskuta Creek (site 1)	A3	3.36	0.02	11.94	79.03	9.01	0.303
Happy Creek	Tr1	0.75	36.21	58.06	4.05	1.67	0.280
d/s Maskuta Creek (site 2)	A4	3.52	0.00	48.24	47.39	4.37	0.161
Hardisty Creek	Tr2	3.42	4.88	45.72	37.86	11.54	3.203
d/s Hinton combined effluent (site 1)	A5	1.57	0.01	72.17	24.35	3.48	0.872
duplicate		2.57	0.00	72.64	24.33	3.04	0.170
d/s Hinton combined effluent (site 2)	A6	2.35	0.09	36.01	55.85	8.05	0.355
d/s Hinton combined effluent (site 3)	A7	2.25	0.00	54.10	40.82	5.08	0.232
d/s Obed Coal Road	A8	1.86	0.05	53.69	40.91	5.35	0.212
u/s Emerson Bridge	A9	1.95	0.22	43.19	48.89	7.70	0.447
d/s Emerson Bridge	A10	1.51	0.02	43.52	48.92	7.54	0.205
u/s Pine Creek	A11	1.35	0.03	76.03	17.60	6.34	0.156
u/s Windfall Bridge	A12	1.6	0.00	62.27	29.19	8.54	0.318
Wapiti River							
u/s Highway 40 (site 1)	W1	0.86	n/a	50.90	40.50	8.60	0.013
u/s Highway 40 (site 2)	W2	0.5	n/a	85.40	10.90	3.70	0.02395/0.00186
u/s Highway 40 (site 3)	W4	0.69	n/a	80.10	15.20	4.70	0.000
WWTP to Weyerhaeuser CW (site 1)	W5	1.68	0.02	61.15	28.01	10.84	0.028
WWTP to Weyerhaeuser CW (site 2)	W7	3.2	0.02	61.34	26.72	11.94	0.017
Weyerhaeuser CW to FE (site 1)	W8	4.12	0.01	64.74	28.65	6.60	0.182
Weyerhaeuser CW to FE (site 2)	W9	1.08	0.00	43.02	45.10	11.88	0.018
Weyerhaeuser FE to RR br. (site 1)	W11	1.66	n/a	22.20	62.90	14.90	0.064
Weyerhaeuser FE to RR br. (site 2)	W10	1.97	0.00	21.57	61.64	16.79	0.113
Weyerhaeuser FE to RR br. (site 3)	W14	0.62/0.58	n/a	76.30	18.20	5.50	0.016
RR br. to Bear River (site 1)	W15	1.76	0.01	62.97	25.78	11.25	0.015
RR br. to Bear River (site 2)	W16	0.41	n/a	79.70	15.60	4.70	0.019
RR br. to Bear River (site 3)	W18	0.4	n/a	52.70	37.10	10.20	0.037
Bear River to Smoky River (site 1)	W21	1.29	0.00	57.99	29.75	12.26	0.173
Bear River to Smoky River (site 2)	W22	1.18	n/a	56.90	34.20	9.30	0.020
Bear River to Smoky River (site 3)	W24	1.44/1.16	n/a	72.00	19.60	8.40	0.054
Bear River							
u/s Wapiti River	B9	1.26	n/a	47.40	33.80	18.80	0.119
u/s Bear River Reservoir (site 1)	B1	2.94	0.06	36.42	26.92	36.66	0.095
u/s Bear River Reservoir (site 2)	B2	4.23	0.04	17.74	42.65	39.61	0.054
u/s Bear River Reservoir (site 3)	B3	2.68	0.37	41.80	27.55	30.65	0.110
Bear River Reservoir	B4	3.41/3.70/ 3.52	0.19/0.06/ 0.05	24.39/24.53/ 24.69	34.51/34.14/ 34.29	41.10/40.33/ 41.02	0.571/0.540/ 0.576
d/s Bear River Reservoir (site 1)	B5	1.21	0.02	56.60	25.95	17.45	0.514/0.517
d/s Bear River Reservoir (site 2)	B6	1.25	0.25	65.14	22.99	11.87	0.263
d/s Bear River Reservoir (site 3)	B7	1.14	0.03	70.96	15.48	13.57	0.157
u/s Wapiti River	B8	1.43	0.01	57.17	25.96	16.87	0.101
Smoky River							
u/s Wapiti River (site 2)	S1	1.87/1.62	n/a	62.70	29.80	7.50	0.022/0.009
u/s Wapiti River (site 1)	S2	0.93	n/a	66.10	26.30	7.60	0.008

n/a: size determinaton was not carried out

B2. Scatterplots